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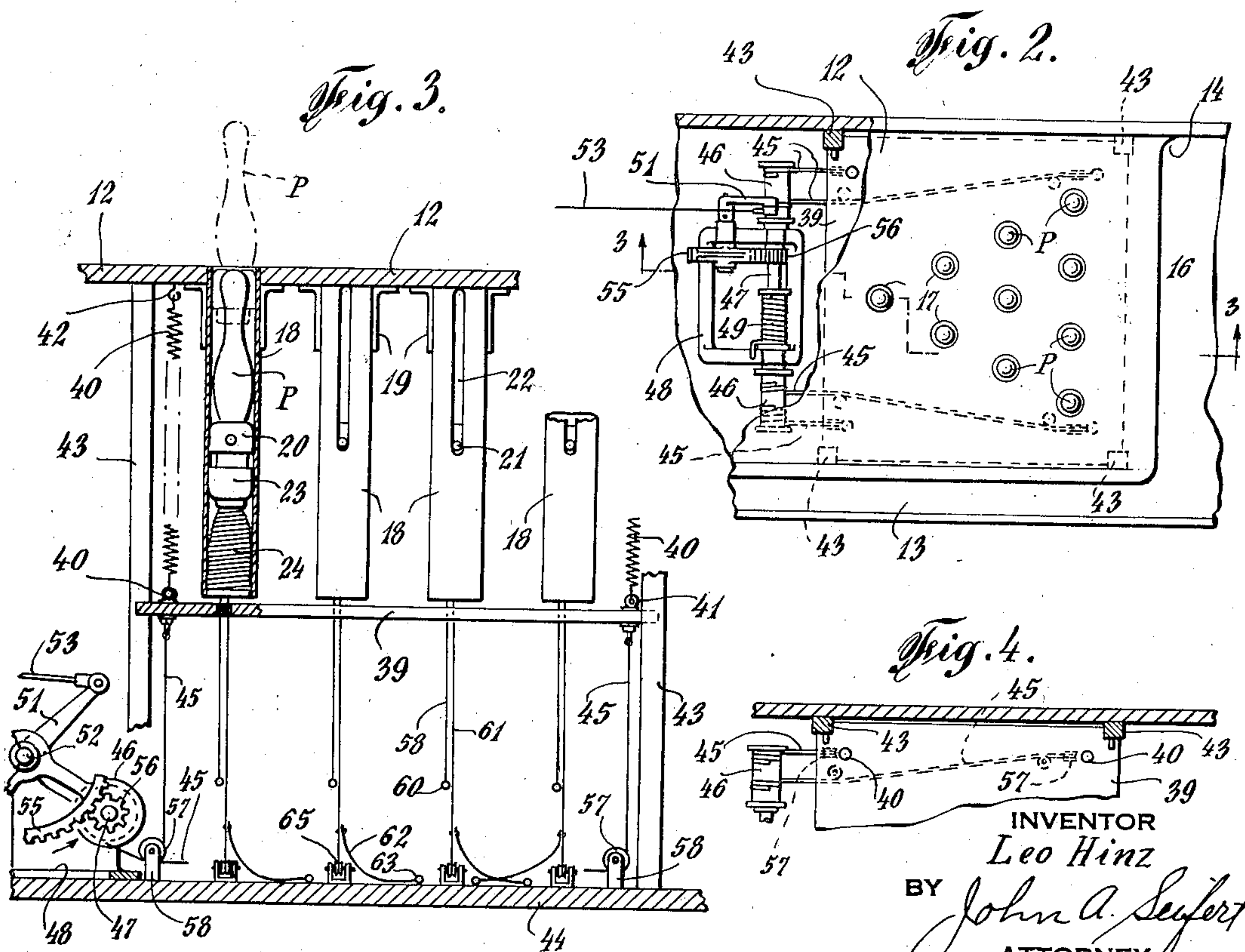
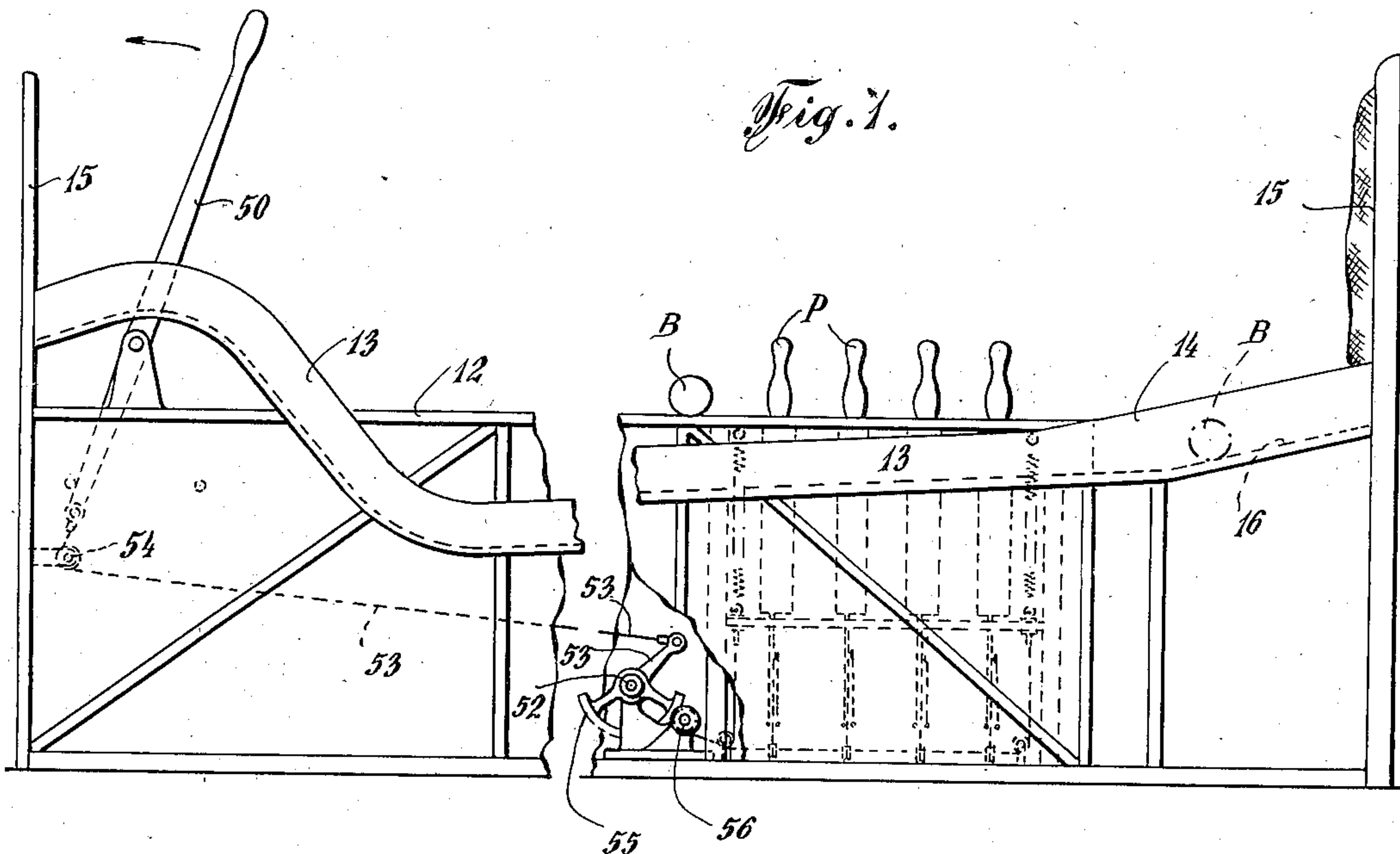
L. HINZ

2,011,580

BOWLING ALLEY

Filed March 17, 1934

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BOWLING ALLEY

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Fig. 5.

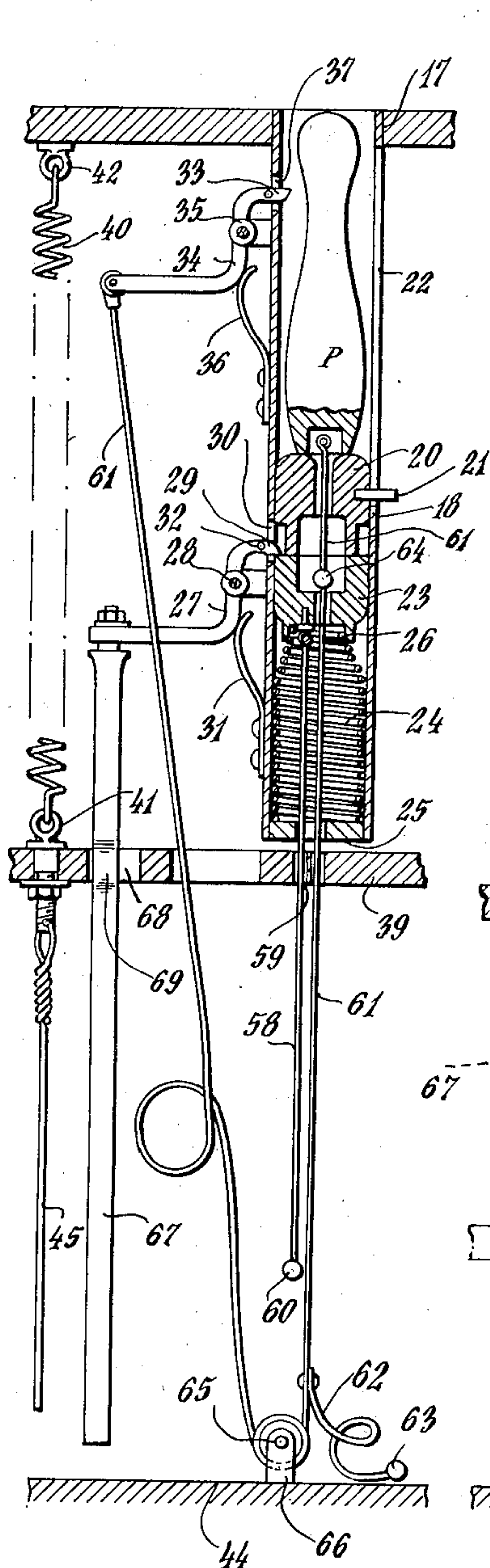


Fig. 6.

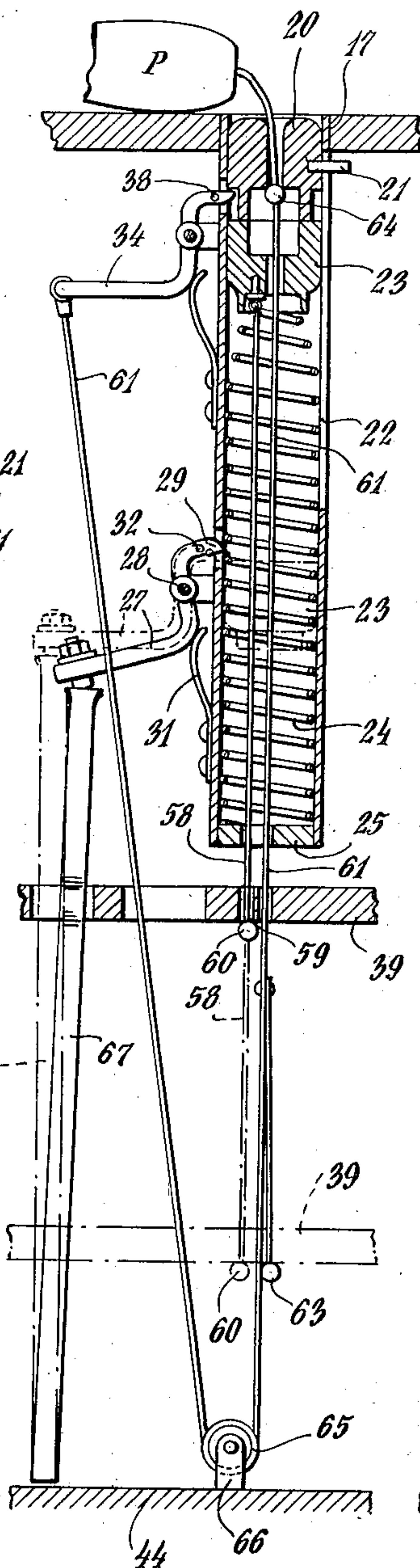
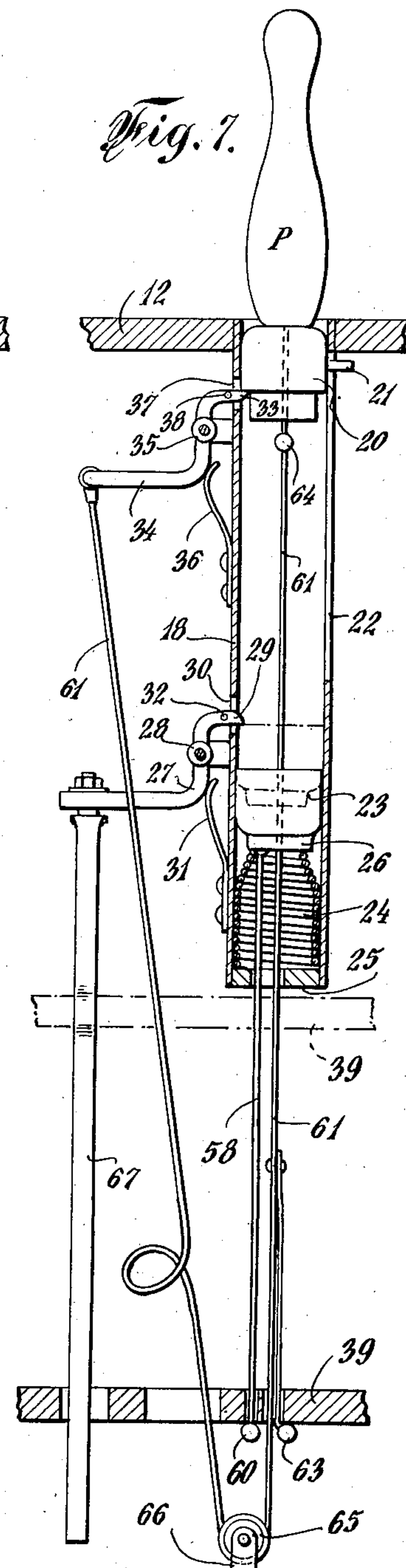


Fig. 7.



INVENTOR  
Leo Hinz  
BY  
John A. Seifert  
ATTORNEY



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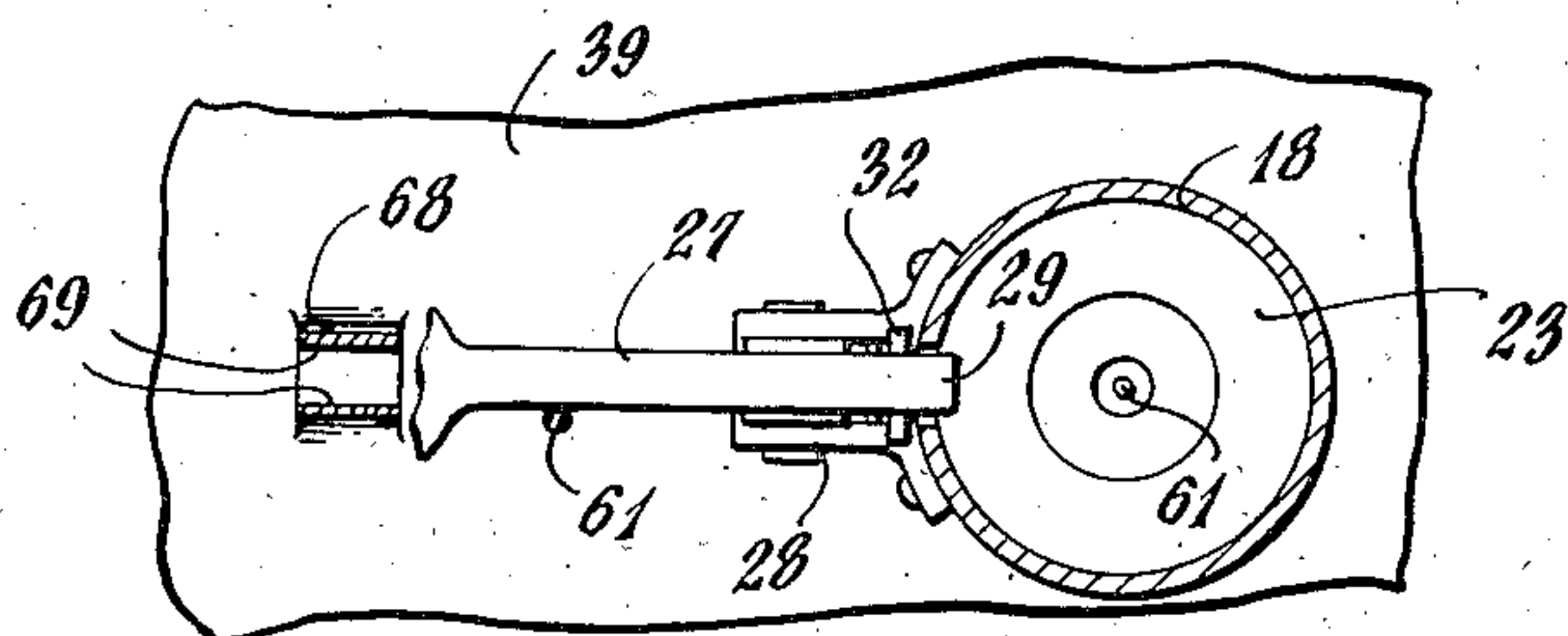
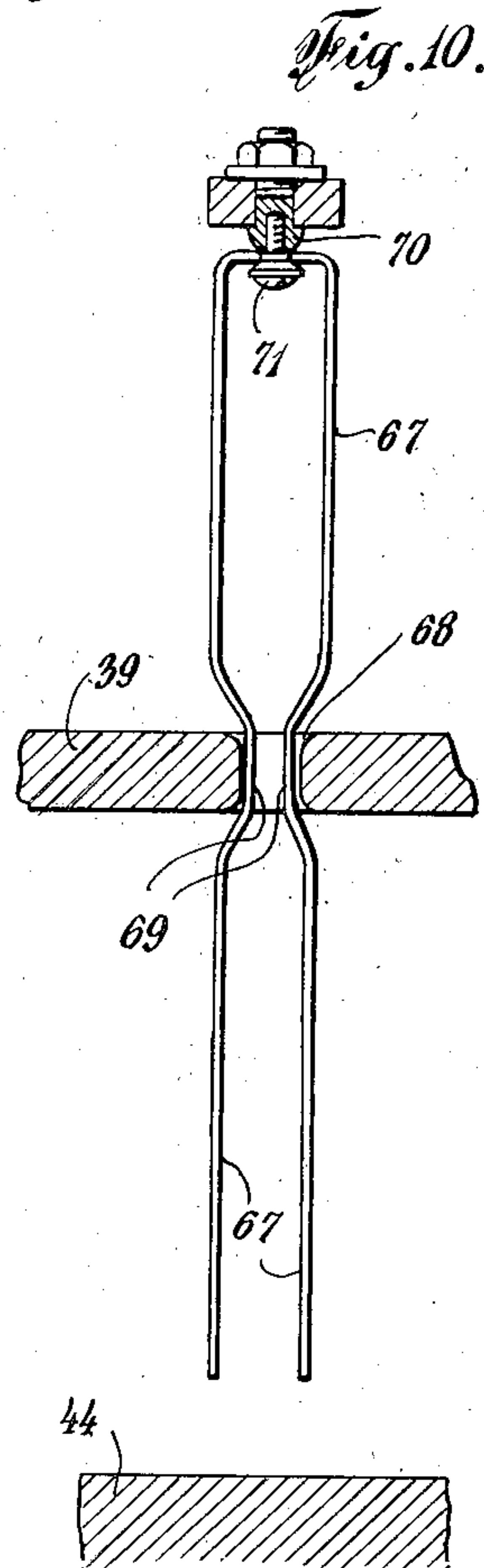
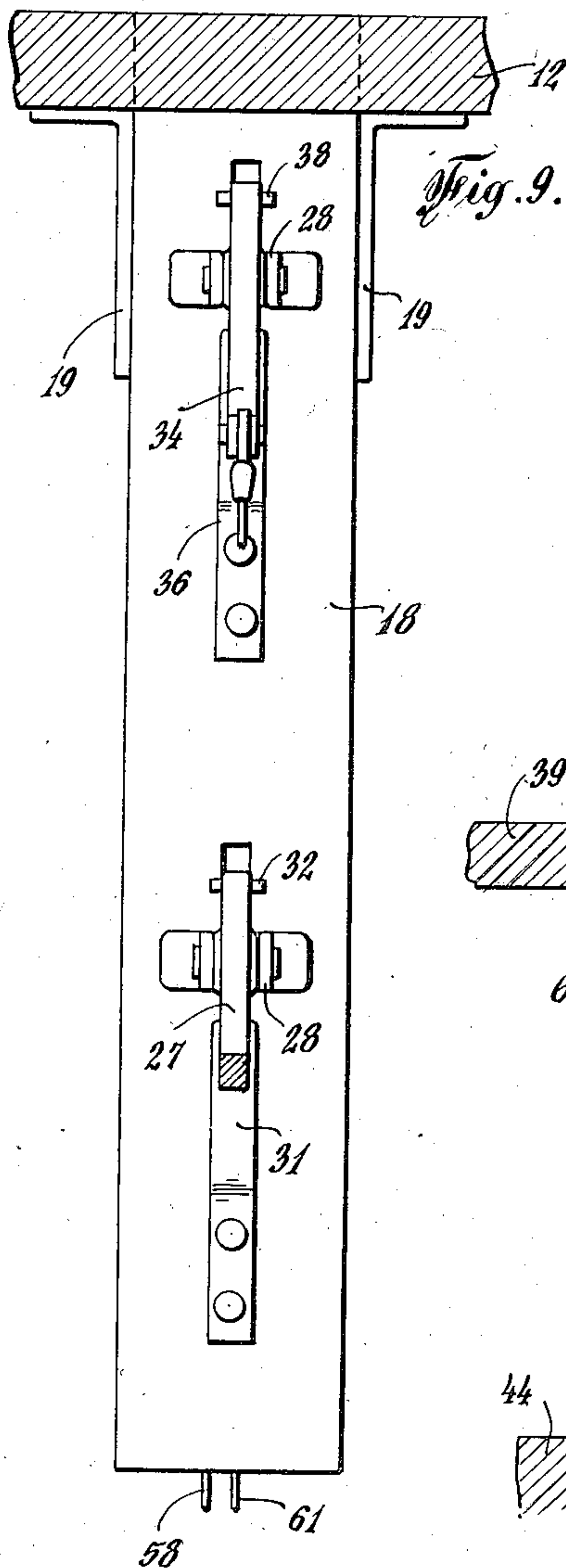
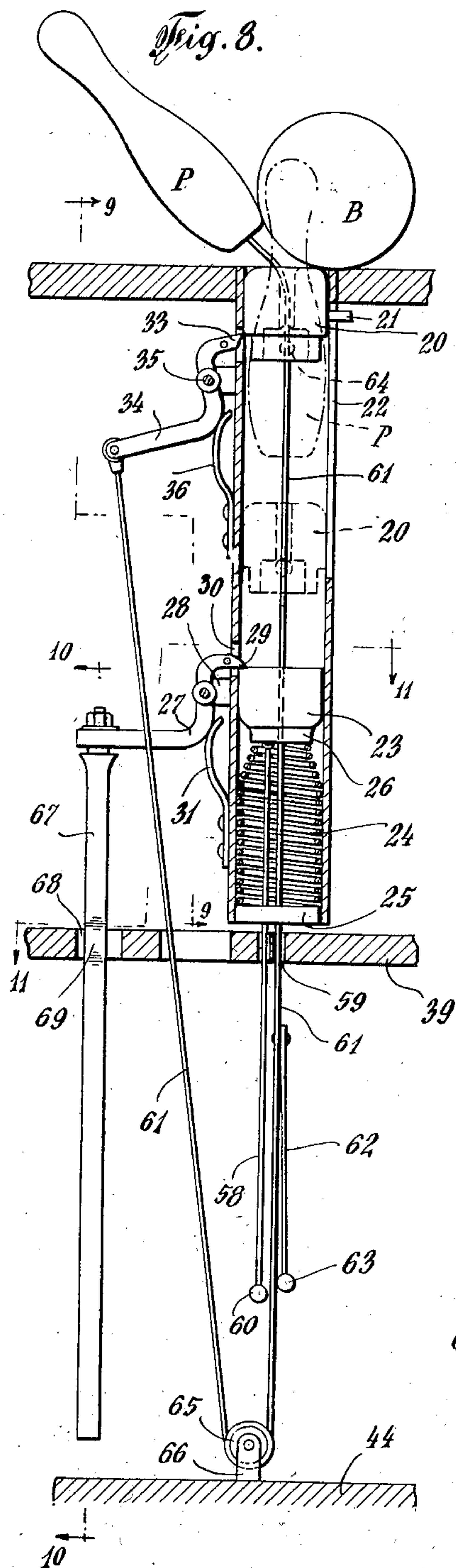
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3 Sheets-Sheet 3



INVENTOR

Leo Hinz

BY

John A. Seifert  
ATTORNEY



## UNITED STATES PATENT OFFICE

2,011,580

## BOWLING ALLEY

Leo Hinz, Newark, N. J.

Application March 17, 1934, Serial No. 716,067

14 Claims. (Cl. 273—45)

This invention relates to the game of bowling wherein pins are set in predetermined arrangement at one end of a bowling board in an alley and are knocked over by a player rolling a ball along the alley board from the end opposite to that at which the pins are set.

It is the primary object of the invention to provide means whereby the pins are set and spotted from the front end of the alley or opposite to that at which the pins are set, to clear the alley board of pins which have been knocked over by a ball rolled along the alley board, and to return the balls from the rear end to the front or player's end of the alley.

It is an object of the invention to provide improved mechanical means to set the pins arranged to clear the alley board of pins which have been knocked over and assemble such pins in relation to the pin setting means.

It is a further object of the invention to provide improved means to collect the balls at the rear end of the bowling board and cause said balls to automatically return to the front or player's end of the bowling board.

Other objects and advantages will hereinafter appear.

In the drawings accompanying and forming a part of this application, Figure 1 is a side elevation of a bowling alley, partly broken away, illustrating an embodiment of the invention.

Figure 2 is a plan view of the rear end of the alley, showing the actuating means for the pin setting means.

Figure 3 is a sectional view taken on the line 3—3 of Figure 2, looking in the direction of the arrows.

Figure 4 is a sectional plan view of a portion of a plate of the means for setting the pins.

Figure 5 is a longitudinal sectional view of a pin setting means, showing the same in position to set the pin.

Figure 6 is a view similar to Figure 5, showing the pin setting means actuated.

Figure 7 is a view similar to Figures 5 and 6, showing a pin support moved to pin setting position and the actuating means restored to its actuating position.

Figure 8 is a view similar to Figures 5 to 7, showing a pin being knocked over by a ball and the releasing of the pin support to effect a clearing of the pin from the alley board.

Figure 9 is a side elevation, on an enlarged scale, taken on the line 9—9 of Figure 8, looking in the direction of the arrows.

Figure 10 is a side elevation of means to re-

lease the pin setting actuating means taken on the line 10—10 of Figure 8, looking in the direction of the arrows; and

Figure 11 is a cross-sectional view taken on the line 11—11 of Figure 8, looking in the direction of the arrows.

In the embodiment of the invention illustrated in the drawings, there is provided an alley arranged with an alley or bowling board 12 adapted for the setting thereon of a series of pins P in predetermined spaced relation at the rear end. A ball runway 13 is arranged longitudinally of the alley to return the bowling balls B from the rear end to the forward end thereof, said runway having a portion declined from the rear end toward the front end of the alley and merging into an upwardly inclining portion and the alley merging with a ball support at the forward extremity, whereby the balls will roll by gravity from the rear end to the forward end of the runway. To automatically deliver balls to said runway and return the balls to the forward or player's end, there is provided a ball receiving pit 14 at the rear end of the bowling board, the rear of which pit is extended upward and provided on the surface with a cushioning means 15. The rear end of the ball runway 13 opens to a side of the pit with the outer wall thereof extended to constitute a side wall of the pit. The bottom 16 of the pit is arranged to incline from the rear of the front end and from the side opposite the ball runway toward the entrance to said runway, whereby the balls will roll from the pit into the runway.

In the embodiment of the means to set and spot the pins relative to the bowling board and clear pins which have been knocked over from the bowling board by a ball rolled from the front end of the alley, whereby a player may also set and clear the bowling board of pins and thus eliminate the services of the usual pin boy to set the pins. For this purpose, the bowling board is provided with a series of openings 17 arranged in predetermined spaced relation, in the present instance arranged to conform to the setting of pins in the ten pin bowling game. Pin receiving housings are extended below the bowling board and open to said openings and supported from the bottom of the bowling board by brackets 19, as shown in Figures 3 and 9.

To support the bowling pins within and in set position relative to the bowling board, a support in the form of a block 20 is arranged in each housing to have sliding movement outward from and into the housing, the block being guided by



a pin 21 fixed therein and extended laterally through a slot 22 in the wall of the tube, and said pin limiting the outward movement of the support by engaging the under-surface of the bowling board. In normal position, the supports 20 with the bowling pins within the housings, the support engages and is supported upon a piston or ram 23 in each housing, as shown in Figure 5, and the piston is actuated to move the pin support 20 upward and to eject the bowling pin from the housings onto the bowling board by a spiral spring 24, the one end of the spring abutting and being supported by a closure 25 secured in the lower end of the tube, the convolutions of the spring coils at the upper end being of reduced diameter and seated in a recess in the bottom of the piston 23, as shown at 26. The piston 23 is normally releasably held in position with the spring compressed and the bowling pin and support therefor within the housings, as shown in Figure 5, by a latch 27 in the form of a lever pivotally supported intermediate the ends by a bracket 28 fixed to the exterior of the housing, the ends of the latch being extended in opposite directions at substantially a right angle. The one end of the latch is arranged with a nose 29 by rounding the corner at the end and upper surface of the latch, and the nose is arranged in opposed relation to and for movement into the housing through an opening 30 to engage a flat face of the nose with the end of the piston, the latch being urged by a spring 31 to extend the nose into the opening 30 for engagement by the piston and such movement being predetermined and limited by a pin 32 extended transversely through the latch and the opposite ends adapted to straddle and engage the tube at the opposite side walls of the opening.

To eject the pins from the housings onto the bowling board and position the supports 20 with the upper surface substantially flush with or in a plane slightly below the upper surface of the bowling board, as shown in Figure 6, the latches 27 are actuated to move the nose 29 out of engagement and release the pistons 23, as shown in Figure 6, whereby the pistons with the superposed pin supports and bowling pins are moved upward, the supports being retained in position at the upper end of the housings by the flat underside of a nose 32 of a latch 34, similar to latch 27, engaging below and with an end surface of an annular recess in the supports formed by reducing the diameter of the end of the supports. The latches 34 are pivotally supported intermediate the ends by brackets 35 fixed on the exterior of the housing, and are urged by springs 36 to extend the nose through an opening 37 into the housings, such movement being limited by the ends of a pin 38 extended transversely through the latch straddling the opening 37. The end of the nose opposite to the flat face is rounded, and the end of the supports is also rounded, whereby as the supports move pass the nose extended into the path of movement thereof the rounded edge of the supports will engage the rounded portion of the nose thereby not only readily passing the nose, but actuating the latch on its pivot support and move the nose out of the path of movement of the support, and as the support moves beyond the latch nose the latch will be instantly actuated by its spring 36 to engage the nose below the shoulder formed by the reduced end of the support. In this condition, the parts will be in the positions shown in Figure 6, and to set and spot the bowling pins

P upon the supports 20, as shown in Figure 7, and restore the springs 24 to their compressed condition with the pistons 23 relative to the nose 25 of latches 27 to hold the springs in compressed condition, as shown in Figure 5, there is provided a rectangular plate 39 supported in a horizontal position below the housings 18 to have movement in vertical direction toward and away from the lower end of the housings, and supported and urged toward the housings by springs 40, there being four of said springs in the present instance, one adjacent each corner and attached at one end to an eye of bolts secured in the plate, as at 41, and the opposite end of the brackets attached to members 42 secured in and extending from the bottom of the bowling board. To guide the actuating plate 39 in its movements, vertically fixed posts 43 are provided to extend between the bowling board and the supporting floor 44 for the slidable engagement of recesses in the corners of the plate, as shown in Figures 2, 3, and 4. The plate is actuated against the tension of the supporting springs 40 by a series of four cables or chains 45 fixed at one end to drums 46 fixed to the opposite ends of a shaft 47 rotatable in a bracket 48, the opposite ends of the cables being secured to the spring connecting bolts 41 for the supports 40. The shaft is urged by a spring 49 to unwind the cables from the drums, and is rotated to wind the cables on the drums and move the plate 39 against the tension of supporting springs 40 by a pivoted lever 50 (Figure 1) having a hand grip at one end and the opposite end connected to an arm 51 fixed on a shaft 52 rotatable in bracket 48 by a cable or chain 53 engaged around a grooved pulley 54 and attached at one end to the lever 50 at the end opposite the hand grip and at the opposite end to the arm 51, a toothed wheel or segment 55 fixed on the shaft 52 meshing with a pinion 56 fixed on the drum shaft 47. To exert a pulling force on the plate through the cables 45 and to guide said cables to the drums 46, they are engaged about grooved pulleys 57 rotatably mounted in brackets fixed to the floor 44. By the movement of the lever 50 in the direction indicated by the arrow in Figure 1, the drum shaft 52 will be rotated against the tension of spring 49 and move plate 39 against the tension of its supporting springs 40.

The movement of the plate 39 is transmitted simultaneously to spring compressing movement of all of the pistons 23 and to simultaneously set and spot all of the bowling pins P on the elevated supports 20. For this purpose, an actuating member 58, which may be a cable, chain or rod, is secured at one end to the bottom of each of the pistons 23. (Figures 5 and 6), and are extended through openings 59 in the plate 39 and have an abutment 60 fixed to the free end at the bottom side of the plate. A flexible member 61, which may be a cable or chain, is fixed at one end to each of the bowling pins within a recess in the bottom thereof and is extended through openings in the pin supports 20 and pistons 23, through the spring 24, an opening in the end closure disks 25 of the housing and openings in the plate 39, which may be the same openings through which the piston actuating members 58 extend. Each of said flexible members 61 has an abutment 63 secured thereto at some distance from the abutments 60 on the members 58, and said abutments 63 being carried at the end of auxiliary flexible members 62 attached at the end opposite the abutments to the flexible mem-



bers 61 for a purpose to be hereinafter described.

In the exhausted position of the piston actuating springs 24 the pistons 23 and pin supports 20 are in the positions shown in Figure 6, and the pins in knocked over position on the bowling board with the abutments 60 engaging the plate 39 and the abutments 63 some distance below said plate. In this position of the parts, the hand lever 50 is actuated to rotate the drums 46 to wind the cables 45 thereon and thereby moving the plate 39 downward, the plate engaging abutments 60 drawing the pistons through the members 58 downward, the pin supports 20 being retained in their elevated positions due to the engagement of the latches 34 therewith. As the pistons ride over the rounded nose 29 of the latches 27, they will actuate said latches to move the nose of the latches out of the path of movement of the pistons, and when the pistons pass the latch nose they will be projected into the housing by the springs 31 to engage over a marginal portion of the pistons. In this position of the pistons, the actuating plate 39 will be in the dot and dash line position shown in Figure 6 engaging the abutments 63 and the continued downward movement of the plate and adjustment of the pistons to the position shown in Figure 7 will take up the slack in the flexible members 59 and thereby move the bowling pins to set and spot them on the supports 20 held by the latches 34, as shown in Figure 7. The hand lever is then relieved of the actuating force when the drum returning spring 49 and the plate supporting springs 45 will return the actuating plate to the position shown in Figures 5 and 8 and in dot and dash lines in Figure 7, with the pins P set upon the respective pin supports 20, as shown in Figure 7, and the springs held in compressed condition by the nose of the latches 27 engaging the pistons, as shown in Figures 5 and 8.

To clear the bowling board of pins which have been knocked over, the flexible pin setting members 61 are each engaged about grooved pulleys 65 rotatably carried by brackets 66 fixed to the floor 44 and the opposite end connected with the latches 34, the flexible members 61 being of a length to provide a slight slack therein with the pins in said position, as shown in Figure 7, to permit a pin P as it is struck by a ball to be partially knocked over and take up such slack and during the initial falling movement of the pin to the bowling board, exert a force on the latch to move the latch nose out of engagement with the pin support 20. As the nose 33 of the latches 34 is moved out of engagement with the pin supports 20, said supports will drop by gravity in the housing 18, as shown in dot and dash line in Figure 8, into engagement with and to be supported by the pistons 23. To connect the bowling pins P with their supports 20 and permit the pins to have a limited movement relative to their supports, for instance, to permit said pins to be ejected from the housings onto the bowling board, as shown in Figure 6, an abutment 64 is fixed on each of the flexible members 61 and arranged in pockets formed by opposed recesses in the pistons and pin supports 20 with the parts as shown in Figure 6. The pin supporting blocks 20 are of a weight slightly greater than the weight of the pins, and as said supporting blocks drop in the housings, by the release of the latches therefrom as the pins are knocked over, the supporting blocks will engage with the abutments 64, thereby coupling the blocks through the flexible members 61 with the bowl-

ing pins and draw said pins into the housings, as shown in dot and dash line in Figure 8 and in full lines in Figures 3 and 5.

To set the bowling pins, the latches 27 are released from the pistons 23 to permit the pistons to be actuated under the influence of the springs 24. The latches 27 are released from the pistons by and during the initial downward movement of the actuating plate 39. For this purpose, an elongated U-shaped member 67 is movably connected at the leg connecting portion to each of the latches 27 to be suspended therefrom with the ends of the legs free, as shown in detail in Figure 10. The legs of these members have a constricted portion, as at 69, at a predetermined point between the ends to arrange said members with an abutment, and said members are extended through openings 68 in the actuating plate 39 having a cross sectional area substantially the same or slightly greater than the constricted portion 69 of the legs of said members. To permit of a slight rocking movement of the members 67 relative to the latches, as for instance from the dot and dash line to the full line position in Figure 6, bolts having rounded heads are secured in the latches 27, as shown at 70 in Figure 10, and the members 67 are secured to said bolt heads by flister screws 71 extended through an opening in the leg connecting portion of the members 67 and threaded into the bolt heads. In the normal position of the parts with the bowling pins within the housings, as shown in Figure 6, the constricted portion 69 of the members 67 engages the openings 68 in plate 39, and as the plate is moved downward, the constricted portion 69 will form an abutment in the walls of the plate openings to engage with and thus couple the member 67 and latches 27 with the plate until the latches are moved to the limit of their movement against the springs 31, as shown in Figure 6, when the resistance offered to the further movement of the members 67 will cause the walls of opening 68 to ride up and out of engagement with the restricted portion 69 and slide along the plane portions of said members, the latches upon the relief of the force of the plate on the abutments 69 being returned by the springs 31 to their normal position shown in Figures 5 and 7. During the return movement of the plate 39, the walls of opening 68 will again be positioned relative to the constricted portion 69 of the members 67.

It will be obvious that various modifications may be made in the construction and arrangement of parts, and that portions of the invention may be used without others without departing from the scope of the invention.

Having thus described my invention, I claim:

1. In a bowling alley, a bowling board having a series of predetermined spaced openings, a tubular housing supported to extend below the bowling board in alignment with and opening to each opening therein, spring actuated means in each housing, releasable means to hold the spring actuated means under tension, a pin support superposed to the spring actuated means and slidable in each housing, means to releasably hold the pin supports with the upper surface substantially flush with the bowling board, a pin engaged on the support in each housing, means to connect the pin with the support holding means and with the support to have a limited movement relative thereto, and means operative to release the spring actuated means to actuate the spring supports to



the support holding means and eject the pins from the housings to the bowling board, tension the spring actuated means and set the ejected pins on the supports held by the holding means, and a pin when knocked over through the means connecting the pin with the holding means and pin support releasing the holding means from the pin support and permitting said support to drop to its actuating means and draw the pin into the housing.

2. In a bowling alley, pin setting means as claimed in claim 1, wherein each of the spring actuated means comprises a spiral spring abutting a bottom closure of the housing, and a piston engaged upon the spring and slidable in the housing.

3. In a bowling alley, pin setting means as claimed in claim 1, wherein the means to hold the spring actuated means under tension comprises a latch pivotally supported on the exterior of the housing having a nose at one end in alignment with an opening in the housing, and a spring to urge the latch to position with the nose extended through the opening to predetermined position in the housing adapted to engage over and hold the spring actuated means under tension and to be moved out of the path of the actuating means when it is placed under tension.

4. In a bowling alley, a bowling board having a series of predetermined spaced openings, a series of pins equal in number to the openings, means to set and spot the pins relative to the bowling board, comprising a tubular housing supported in alignment with and open at one end to each opening to extend below the bowling board and each housing having a spiral spring seated at one end at the lower end of the housing, a piston engaging the spring and slidable in the housing, means to releasably hold the piston in position with the spring compressed, a block superposed to and slidable in the housing, and to which a pin is superposed and engaged within the housing with the spring compressed, means to releasably support the block in the tube with the upper surface substantially flush with the bowling board, means to connect the pin with said releasable block supporting means and with the block to permit of a limited movement of the pin relative to the block, and means operative to release the piston holding means and actuation of the piston to position the block relative to its releasable supporting means and eject the pin from the housing to the bowling board and actuate the piston to compress and place the spring under tension and set the pin on the block supported by its releasable supporting means, and said pin when bowled over through its connection means with the block supporting means actuate said means to release and permit the block to drop to the piston in the housing and the block through said connection means draw the pin within the housing.

5. In a bowling alley, pin setting means as claimed in claim 4, wherein the means to hold the piston in position with the spring compressed, comprises a latch pivotally supported on the exterior of the housing having a nose in line with an opening in the housing, and a spring to urge the latch to position with the nose extended through the opening to a predetermined extent into the housing, and said nose arranged to engage and hold the piston in spring compressing position and to be actuated out of the path of movement of the piston as it is moved to spring compressing position.

6. In a bowling alley, pin setting means as

claimed in claim 4, wherein the means to releasably support the block with the upper surface flush with the bowling board and support a pin thereon, comprises a latch having a nose in line with an opening in the housing, and a spring to urge the latch to position to extend the latch nose through the opening to a predetermined extent into the housing, and said means arranged to be moved by the block out of the path of movement of the block and to engage and support the block.

7. In a bowling alley, pin setting means as claimed in claim 4, wherein the means to connect the pin with the releasable block supporting means and block, comprises a flexible member looped about a pulley and attached at one end to the block supporting means and the opposite end portion extended through the spring, piston and block and attached to the bottom of the pin, and an abutment on said member for engagement of the block upon the release of its support by the bowling over of the pin to draw the pin into the housing by the dropping of the block in the housing.

8. In a bowling alley, pin setting means as claimed in claim 4, wherein the means to connect the pin with the releasable block supporting means and block and set the pin ejected to the bowling board on the block positioned relative to its supporting means, comprises a flexible member looped about a pulley and attached at one end to the latch and the opposite end portion extended through the spring, piston and block and attached to the bottom of the pin, and an abutment on said member for engagement of the block upon the release of its support by the bowling over of the pin to draw the pin into the housing by the falling of the block, a second abutment attached to the flexible member, and means to co-operate with said second abutment to set the pin ejected onto the bowling board on the block positioned relative to and supported by its supporting means.

9. In a bowling alley, a bowling board having a series of predetermined spaced openings, a series of pins equal in number to the openings, means to set and spot the pins relative to the bowling board, comprising a tubular housing supported at one end in and open to each opening and extending below the bowling board, a spiral spring in the housing engaging an abutment in the lower end of the housing, a piston superposed to the spring, a spring influenced latch to hold the piston in position with the spring compressed, a spring influenced latch to releasably support the block in the tube with the upper surface substantially flush with the bowling board, a flexible member looped around a pulley mounted on a carrier fixed below and in spaced relation to the bowling board, said member at one end connected with the block supporting latch and the portion at one side of the pulley extended through the spring, piston and block and attached at said end to the bottom of the pin and having an abutment connected thereto at the bottom of the block to permit of limited movement of the pin relative to the block, a second abutment connected to said flexible member, an actuating member extended through the spring and attached at one end to the piston and having an abutment attached to the opposite end, and means to release the holding latch from the piston and the actuation thereof by the spring to move the block relative to its supporting latch and eject the pin onto the bowling board, actuate the piston through its actuating



member relative to its holding latch and compress the spring, and then coupled with the flexible member connected to the pin through the second abutment and set the pin upon the block positioned relative to its supporting latch.

10. In a bowling alley, as claimed in claim 9, an elongated U-shaped member suspended from the piston holding latch arranged with an abutment intermediate the ends, and the means to effect release and actuation of the piston and setting of the pins, comprises a horizontal plate arranged below and movable toward and away from the housings, and said plate having openings for the passage of the flexible members with the second abutments attached thereto positioned below the plate and passage of the piston actuators with the abutments attached thereto positioned below the plate, and restricted openings for the passage of the U-shaped members suspended from the piston holding latches with the abutments engaging the plate in its normal position, means to yieldingly urge the plate upward, and means to move the plate downward and the plate during said movement in successive sequence engaging the abutments to release the piston holding latches, impart spring compressing movement to the pistons and pin setting movement to the flexible members.

11. In a bowling alley, a bowling board, a series of pin receiving housings extended downward from the board and open to openings in predetermined spaced relation in the board, a pin support slidable in each housing to support the pins within the housings and in the plane of the bowling board, means associated with each housing to releasably hold the pin supports in the plane of the bowling board, spring actuated means to move the pin supports relative to the releasable holding means therefor and eject the pins onto the bowling board, means connected to the holding means for the pin supports and the pins to set the pins ejected onto the board on the supports positioned relative to the plane of the bowling board and adapted to release said holding means when a pin is knocked over to permit the support for said pin to drop and draw the pin into its housing, and means operative in successive sequence to release the spring actuated means, place the spring actuated means under tension and set the pins ejected onto the bowling board on the supports positioned relative to the holding means therefor.

12. In a bowling alley, a bowling board having a series of predetermined spaced openings, pins equal in number to the openings in the board, a tubular housing fixed to and extended downward from the board in alignment with each opening, a pin supporting block slidable in each housing adapted to assume a position by gravity within the housings, means to releasably support the pin supporting blocks with the pin engaging surface thereof substantially in the plane of the bowling board, means to actuate the pin supporting blocks to position relative to and for engagement with their supporting means and eject the pins from the housing onto the bowling board, means attached to the pins and said block supporting means and connecting the pin supporting

blocks with the pins to permit the pins to have limited movement relative to the supporting blocks, and said means by the knocking over of said pins actuating the block supporting means to release and permit the pin supporting blocks to drop into the housings and through the connection of the pin supporting blocks with the pins draw the pins into the housings.

13. In a bowling alley, a bowling board having a series of predetermined spaced openings, a series of pins equal in number to the openings, a tubular housing supported to extend below the board and in alignment with and opening to each opening in the board in which the pins are adapted to be engaged, a pin support slidable in each housing normally assuming a position to support a pin thereon within the housings, means to releasably hold the pin supports in the housings with the upper surface substantially flush with the bowling board, means within each housing to actuate the supports to eject the pins from the housings onto the bowling board and position the supports relative to and for engagement of the holding means therefor, means to restore said actuating means for the pin supporting and ejecting means to actuating position, and means to connect the pins with the holding means for the supports and the pins with the supports to permit of a limited movement of the pins relative to the supports and operative by the actuating means for the supports when said actuating means is restored to actuating position to set the ejected pins on the supports held by the holding means, and the pins through said connecting means when knocked over adapted to actuate the holding means to release and permit the pin supports to drop into the housings and the supports through said connecting means draw the pins into the housings.

14. In a bowling alley, a bowling board, a series of pin receiving housings extended downward from the bowling board and open to openings in predetermined spaced relation in the board, a series of pins equal in number to the housings, a pin support movable in each housing to support the pins within the housings and in the plane of the bowling board, means to releasably hold said pin supports with the pin engaging surface in the plane of the board, means to actuate the pin supports relative to the releasable holding means therefor and eject the pins onto the bowling board, means attached to and connecting the pins with the releasable holding means for the supports and connecting the pins with the supports to permit of limited movement of the pins relative to the supports, and means to restore said actuating means for the supports to actuating position and through said attaching means set the pins ejected onto the board on the supports positioned relative to the holding means and in the plane of the board, and the pins when knocked over through said attaching and connecting means actuating the holding means to release the pin supports to permit the supports to drop and draw the knocked over pins into the housings.

LEO HINZ.