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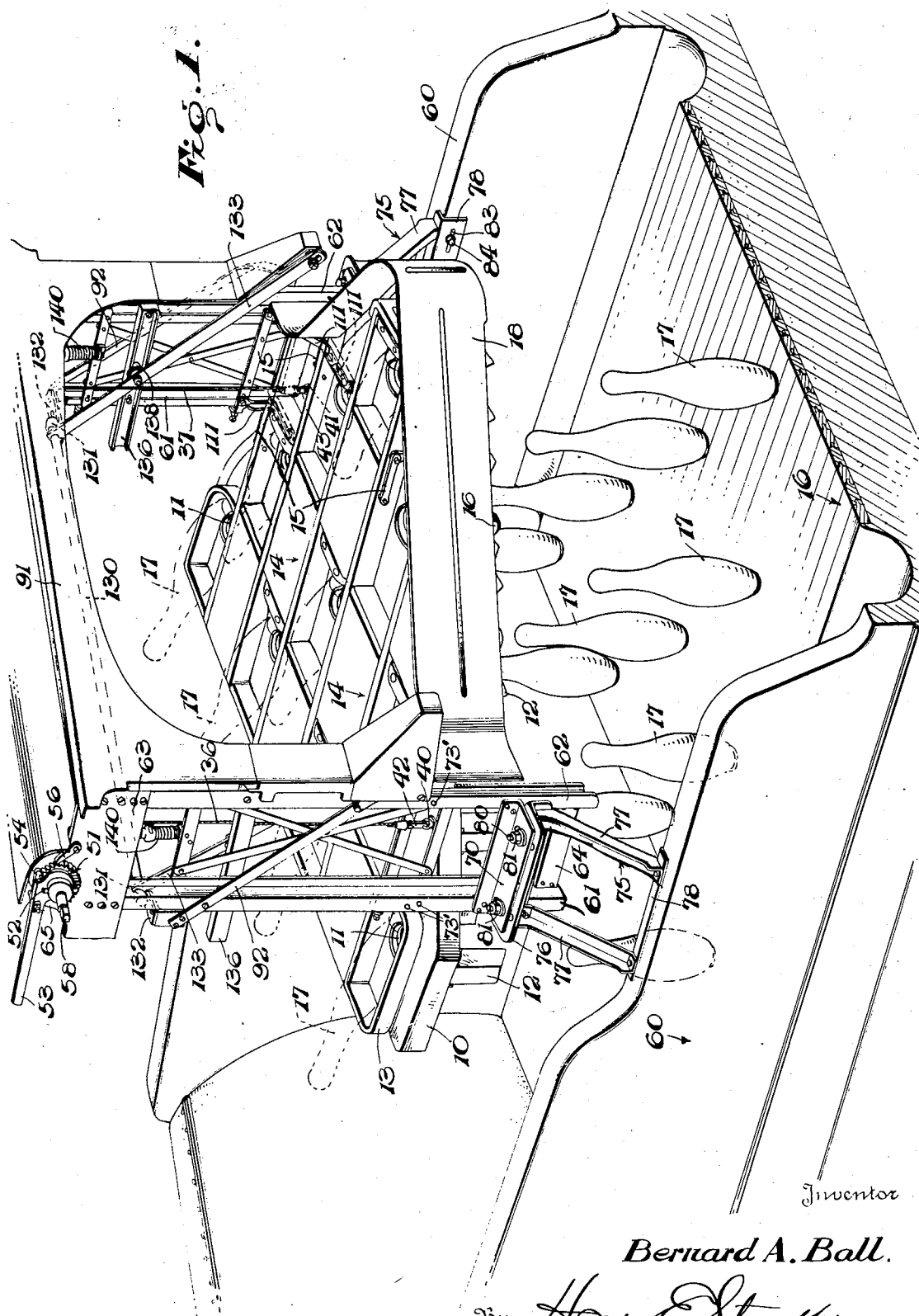
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TENPIN SETTING MACHINE

Filed June 16, 1939

5 Sheets-Sheet 1

Fig. 1.



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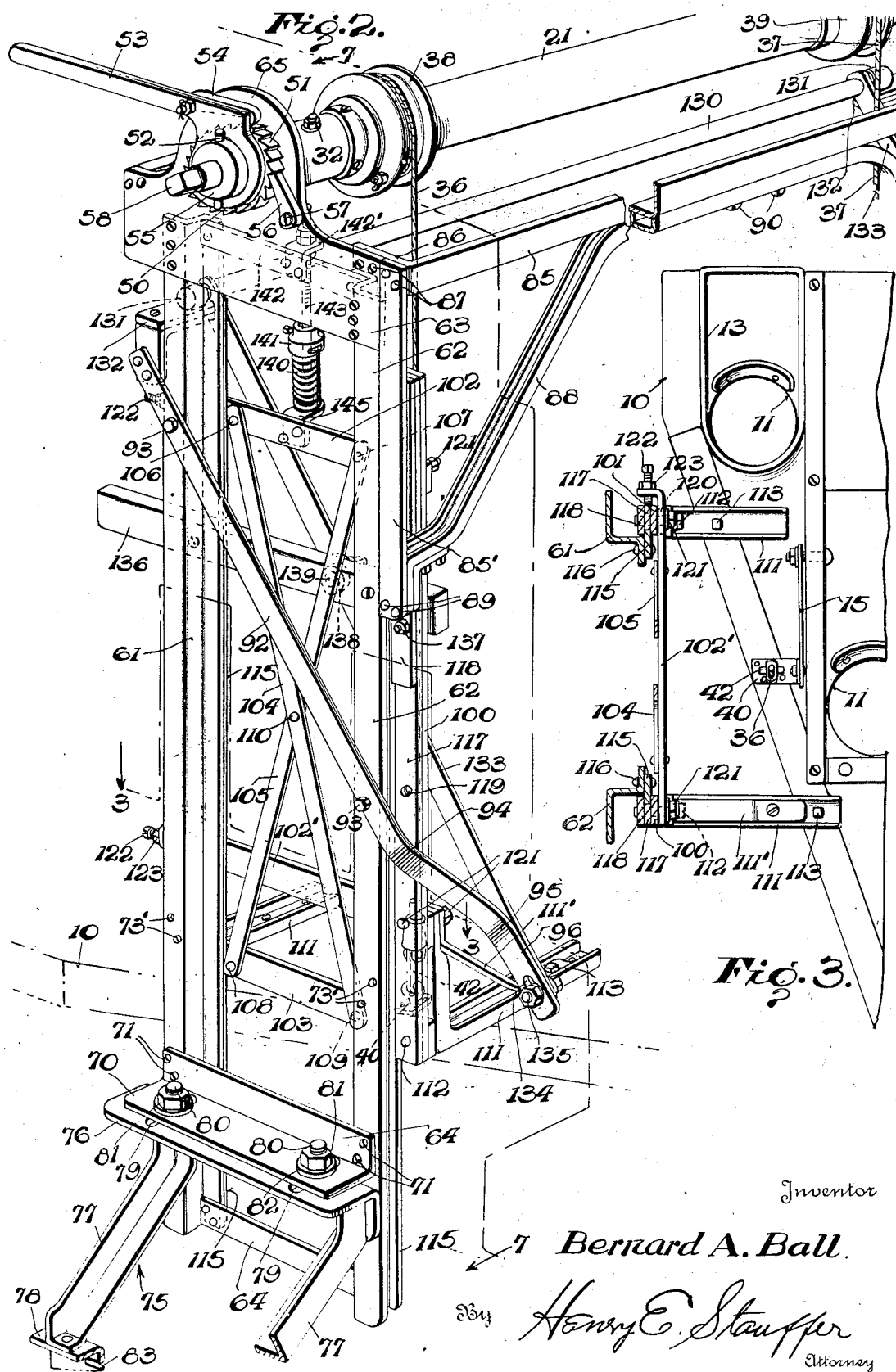
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TENPIN SETTING MACHINE

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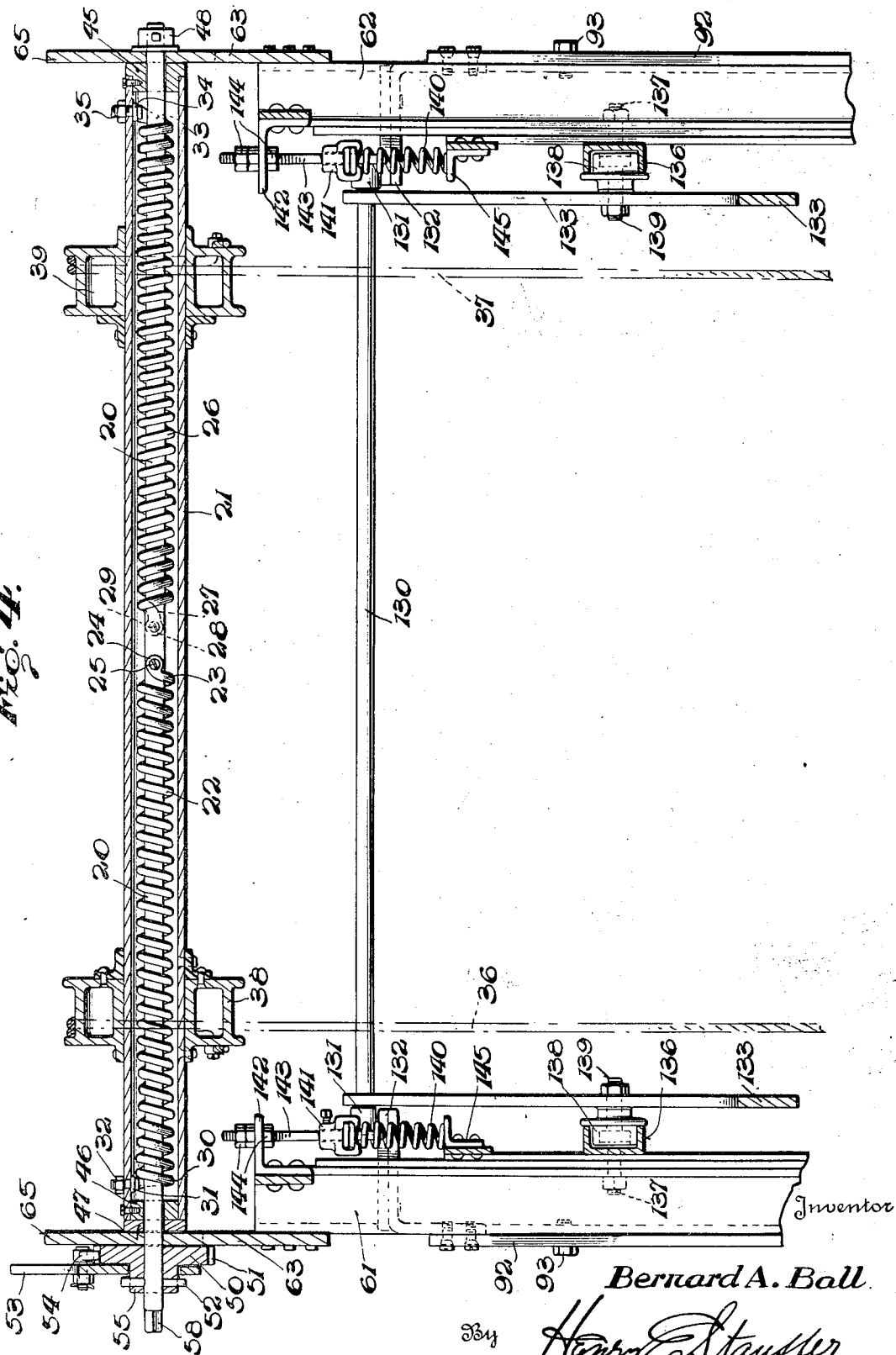
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Fig. 4.



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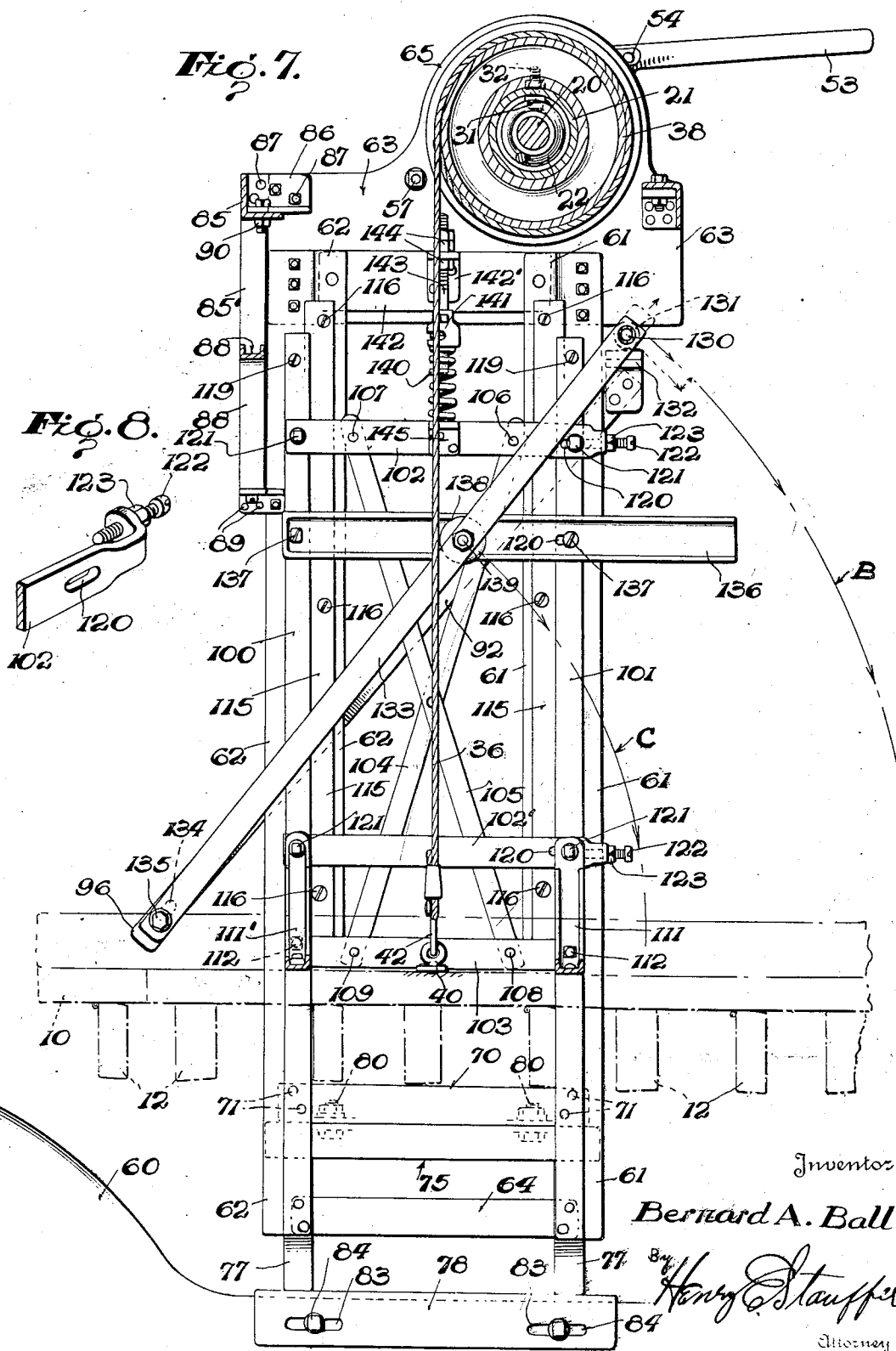
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Fig. 7.



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UNITED STATES PATENT OFFICE

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TENPIN SETTING MACHINE

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6 Claims. (Cl. 273-42)

This invention is in machines for setting or spotting the pins used in bowling, and is an improved construction for accurately, quickly, and easily placing the pins in position on the alley floor.

The principal object of the invention is to so improve certain standard pinsetting machines as to secure more certainty of action and greater reliability of operation in the placing or spotting of tenpins on the bowling alley.

A further object is to produce a pinsetting machine which shall be easily and readily applied as a unit to standard bowling alleys.

Another object is to produce a rigid and reliable pinsetter framework, which shall be able to withstand all ordinary thrusts or displacing influences, so that great accuracy of operation shall be maintained.

A further object is to provide a positive, quick acting, and reliable pin platform restoring means.

A still further object is to secure an operating mechanism which shall be accurate and simple, and dependable in long and continuous operation.

Referring to the accompanying drawings:

Fig. 1 is a perspective view of the machine, looking from the left front, and showing the general construction.

Fig. 2 is an enlarged perspective view of one of the side frames of the machine, and its associated parts.

Fig. 3 is a sectional view of one of the side frames and its associated parts, taken on the line 3-3 of Fig. 2, and looking in the direction of the arrows.

Fig. 4 is a view, partly in section, of the counter-balancing roller and springs.

Fig. 5 is a fragmentary view of one of the brackets by which the machine is secured on the alley and also showing one of the brackets for holding the pin platform to the slides of the machine.

Fig. 6 is a detailed perspective view of one of the mounting brackets, the parts being disassembled.

Fig. 7 is a view of the inside of one of the two side frames, showing the guiding and operating mechanism of the pin platform, taken on the line 7-7 of Fig. 2, and looking in the direction of the arrows.

Fig. 8 is a fragmentary view of one of the guide adjusting devices.

In these drawings, corresponding parts in the several figures are indicated by the same reference characters. As the machine naturally di-

vides itself into several parts or mechanisms, these parts will be described one by one in detail, and the operation of the whole mechanism then explained as far as may be necessary.

Pin carrier

The pin carrier or platform is in general the same as that shown in the patent to Backus No. 809,890, granted January 9, 1906. This construction has been long and successfully used, and so need not be described in detail. It is sufficient here to say that it consists of a structure generally of equilateral triangle shape, with the apex of the triangle pointing toward the front of the machine.

This carrier comprises a lower frame 10, having therein the proper number of pin openings 11, and having pin guides 12 pivoted thereto; and an upper frame 13, having pin rests 14. The upper frame normally lies on the lower frame, and is secured thereto by parallel links 15. Mounted on the upper frame, but extending through and projecting beyond the lower face of the frame, are pendant operating bars 16 which, upon striking the alley, lift the upper or auxiliary frame, and shift the same forward due to the parallel links 15, thus raising the pins from horizontal to vertical position. The pins then fall vertically through the frame and between the guides 12, and stand in proper position on the alley 16. For purposes of identification, the pins themselves are numbered 17. In Fig. 1, the pin carrier mechanism as a whole is provided with an ornamental protective front 18.

In Fig. 1, the full set of pins 17 are shown standing on the alley; at the same time, some are shown in dotted lines in position on the upper frame. Usually, in placing a set of pins, they will all rest on the upper frame 13, and be set on the alley when the platform is lowered; but sometimes some pins will be left standing on the alley, and only those which have been knocked down may be put upon the platform. As the platform is lowered, it will set only those which are on the platform, but will at the same time bring into proper position all those which remain standing on the alley.

Inasmuch as the details of this construction are shown in the Backus patent referred to (No. 809,890), no more detailed description is here necessary.

Counterbalance

As heretofore built, pinsetters have usually been constructed with counterbalancing weights

for restoring the platform to normal position. These weights must be sufficient to overbalance the pin platform when the latter is empty, and so lift the same after the pins shall have been deposited. But the action of all counterweights is sluggish, for they operate according to the laws of gravity, and so travel with continuously accelerated motion. In this construction, I have substituted torsion springs for the weights of earlier machines for restoring the platform to its raised position. Springs, being under constant tension, are quicker in action than weights, and therefore are to be preferred.

Referring to Fig. 4, 20 is a shaft suitably mounted for rotation, and 21 represents a drum or sleeve surrounding the shaft, and rotatable thereon. On this shaft 20 are mounted helical springs 22 and 26. In the form here shown, two springs are used, and these are reversely wound; that is, they are rights and lefts. One end of each spring, in this case, the inner end, is fastened directly or indirectly to the shaft 20. As shown, the inner end 23 of spring 22 has formed thereon a loop 24, and the inner end 27 of spring 26 has formed thereon a loop 28. The loops 24 and 28, and thus the springs 22 and 26, are secured to the shaft 20 by means of screws or bolts 25 and 29 respectively, which screws or bolts pass through the said loops 24 and 28, and into or through the shaft 20. The outer ends of the springs 22 and 26 are secured to the drum 21; the outer end 30 of spring 22 being formed into a loop 31 and secured to the drum by a bolt and nut fastening 32, and the outer end 33 of the spring 26 being formed into a loop 34 and secured to the drum 21 by a bolt and nut fastening 35. The specific means for securing the ends of the springs is not of the essence of the invention, and other satisfactory means of course may be used.

Cords or cables 36 and 37, of wire or other suitable material, are secured to the pin platform. These are wound directly on the drum if this is of sufficient size, or on reels or auxiliary drums, as 38 and 39, secured to the drum 21. The cables have their other ends attached to the pinsetter frame (Fig. 1), 36 being secured at the point 40, and 37 at the point 41. Each cable has, somewhere in its length, a turnbuckle or other adjusting means by means of which slight adjustments can be made; thus, cable 36 has therein a turnbuckle link 42, and cable 37 has located therein a turnbuckle link 43.

The drum or sleeve 21 is mounted on the shaft 20 by means of collars. Referring to Fig. 4, the right hand end of the drum is secured to a bushing 45, which then is mounted for rotation on shaft 20, and the left hand end is secured to a bushing 46, which likewise rotates on shaft 20. As here shown, a washer 47 of any suitable thickness is placed between the collar 46 and the end frame of the machine. A collar 48, secured on the right hand end of shaft 20, and outside the frame, keeps the end of the shaft from slipping through the frame. The left hand end of shaft 20 (Figs. 2 and 4) shows a ratchet wheel 50, having teeth 51, secured to the shaft in any convenient way, as by a pin 52, so as to turn with the shaft. A lever 53, carrying a floating pawl 54, is rotatably mounted on the hub 55 of the ratchet wheel, and a holding pawl 56, pivoted at 57, cooperates with the ratchet teeth to hold the ratchet. One end of the shaft 20 is shaped at 58 to receive a wrench for turning the same, so that the shaft may be turned and the springs

wound either by turning the shaft 20 directly by hand, using a wrench, or by the ratchet and pawl mechanism, as circumstances may require.

By turning the shaft 20, the tension of the springs 22 and 26 may be adjusted simultaneously and at will. In practice, the tension of these springs should be such that they will be able to lift the pin platform quickly when the same is unloaded, but will permit the platform when carrying the pins to fall freely of its own weight, or with only slight additional pressure by the operator. Experience must determine the proper tension.

By this construction, the springs may be simultaneously wound, and with fewer turns of the shaft 20 than is possible with a single spring; and, moreover, a quicker and more effective action is secured with a plurality of short springs, than with a single long spring. There is a sluggishness of action in a long spring which is not present in shorter ones.

While the springs are here shown as connected to the shaft 20 at their inner ends, and to the drum 21 at their outer ends, it is to be understood that of course this arrangement may be reversed, and the outer ends connected to the shaft, and the inner ends to the sleeve.

Framework

One difficulty with earlier machines has been the lack of strength in the frame construction. Accuracy in setting the pins is one of the essentials of pinsetting machines; if the pins are not properly spaced, and accurately placed on the spots provided therefor, the results of the game are uncertain. With present machines, undue pressure on the platform, or accidental contact therewith by the operator, may cause the pins to vary in position on the alley by substantial amounts, thus causing errors in the play. My aim has been to overcome this difficulty, and to this end the main frames are made of sufficient strength to give the necessary rigidity to the machine, and the means for guiding the movements of the pin platform are constructed with a view to special accuracy in bringing the platform to pin setting position.

The framework which supports the pin platform, and its counterbalancing springs, is best shown in Figs. 1, 2 and 3. There are two frames, one on either side of the machine, supported by the kick-backs 60 of the alley, or in some other suitable manner. Each frame, as here shown, is built up of Z-iron uprights 61 and 62 (Fig. 3), and cross pieces 63 and 64. There may be as many of these cross pieces as are found to be necessary; only two are here shown. The top cross pieces 63, Figs. 1 and 7, are each provided with an enlargement 65, through which the shaft 20 of the counterbalancing means passes, and by which it is supported. The collar 48 on the shaft 20 cooperates with the outer face of the cross piece 63 on the right hand frame (Fig. 4), while the ratchet wheel 50 is secured to the other end of the shaft 20 outside the cross piece 63, on the left side of the machine as viewed in Fig. 2.

These side frames may be supported in any convenient way relative to the alley which the machine serves; but as here shown, they are supported by the sides or divisions of the alley beds, usually termed kick-backs. The supporting devices here used are shown applied in Fig. 1, but are illustrated as disassembled in Fig. 6. Each comprises a member 70, in the shape of an angle iron, which is attached by its upright face

to the Z-bars 61 and 62, by means of bolts or rivets 71, which pass through holes 72 in the upright side of the angle iron and corresponding holes 73 in the Z-bars. The other side of the angle bar 70 is provided with elongated transverse holes 74, the purpose of which will be described below.

Cooperating with the angle bar 70 is a member 75, which may be a casting in one or more pieces, or be built up of the members 76, 77 and 78. The part 76 is provided with transversely arranged holes 79 which cooperate with holes 74 in the member 70, and these parts are adjustably secured together by bolts 80, and nuts and washers 81, 82, or by other suitable means. The member 78 is intended to rest on and be secured to the alley divisions or kick-backs 60. Elongated holes 83 are provided in the depending flange of 78, and these members are adjustably secured to the kick-backs 60 by bolts 84 (Fig. 5), or in any other suitable manner. The use of the elongated holes 74, 79 and 83 permits all the adjustability usually needed in the mounting of the machine in the standard alley. If desired, as a means for vertical adjustment, additional or auxiliary holes 73' may be provided in the Z-bars 61, 62.

The two side frames are secured together at their upper ends by a beam such as 85, Fig. 2, of any desired cross section, but here shown as an angle bar. This has its ends bent at right angles, as at 86, and secured to the Z-bars 62 by bolts or rivets 87. Two substantially identical angular braces are provided, one for either side of the machine. Only one of these, 88, is clearly shown in Fig. 2. One end of this brace is supported by a bracket secured to Z-bar 62, by bolts or rivets 89, and to the downwardly projecting bar 85', and the other end is fastened to the transverse beam 85, by bolts or rivets 90. This arrangement is duplicated on the other side of the machine. An ornamental covering, as 91, Fig. 1, may be provided for this construction if desired.

Bars 92, one on each side frame, are arranged diagonally across the side frames, and secured to the Z-bars 61 and 62 thereof by bolts 93. One of these bars 92 is shown in detail in Fig. 2. Referring then to Fig. 2, it will be noticed that the lower end of the bar 92 is bent transversely at 94, and again at 95, thus bringing the lower end 96 to a plane which is substantially parallel to the main body of the bar. The purpose of this offset will be explained below. It is understood, of course, that this same offset is made in the corresponding bar 92 on the other side of the machine. These bars 92, while intended to function primarily with the operating mechanism, to be yet described, also serve as braces to strengthen the side frames.

Guiding mechanism

The pin platform is directed in its movements toward and from the alley by special slides, which move on guideways on the Z-bars of the side frames. As explained above, the side frames have substantial width, as compared with prior constructions, so that they may have greater rigidity. For the same reason, the guides and cooperating parts are preferably made as wide as practicable; and the pin platform is secured directly and rigidly to these slides, so as to move in unison therewith, the purpose being to provide a rigid and highly accurate guiding means.

These parts are best shown in Figs. 2, 3 and 7, to which reference will now be made. Each slide 75 is in the form of a frame comprising members 100

and 101, cross pieces 102 and 103 rigidly secured thereto, and diagonal braces 104 and 105 fastened directly to the other members. The upper ends of the braces 104 and 105 are fastened to the upper cross piece 102 at 106 and 107, and the lower ends thereof are fastened to cross piece 103 at 108 and 109. The two braces may also be secured together or not as preferred. They are here shown riveted or bolted together at 110. A supplemental cross piece 102' is secured to the members 100 and 101 a short distance above the piece 103, for a purpose to be described below. This construction forms a rigid framework, but any other suitable slide may be used. One of these frames is mounted to move freely up and down on each of the main side 15 frames of the machine.

Brackets 111, one at either side of each slide, secure the pin platform proper to these sliding members. One of these brackets is shown in detail in Figs. 2 and 5. The front brackets are made somewhat longer than the rear ones (Fig. 3), and are provided with braces 111'. The upright portion of each bracket is fastened to its slide by rivets or bolts 112 and 121, and the under part is similarly fastened to the top of the platform by 25 bolts or rivets 113, Fig. 3. Thus, the slides and pin platform are secured together, and move upward and downward as a unit. The brackets 111 are secured to the platform as nearly as possible equally distant from the center of gravity thereof, and, being quite a distance apart, form a sufficient support for the platform, so that no special means for raising and lowering the apex of the platform is necessary.

The construction of the guides on which the 35 sliding frames move is best shown in Figs. 2 and 3. Strips or plates 115 are secured by suitable means 116, one to the inside member of each Z-bar, and project slightly beyond the outer edge of this inner member, thus forming a guide or 40 tongue. Fastened to each slide member 100 and 101, so as to be a part thereof, are two other strips, numbered respectively 117 and 118. Any suitable fastening means, such as bolts or screws 119, may be used for this purpose. The strip 117 45 is somewhat narrower than the strips 118, 100 and 101, so that with the outer edges of the strips flush, the members 100 and 101 and the strips 117 and 118 together form grooved structures which are attached to and form a part of the 50 sliding frames. These grooved members are adapted to move on the tongues formed by the outer edges of the plates 115, Fig. 3. These grooved slides are all identical or substantially identical, except that one slide on each sliding 55 frame is preferably provided with an adjustment, so that it can be shifted with respect to the edge or tongue of member 115, to take up wear and secure accuracy of movement. This adjustment 60 may be on either edge of the slide, or even on both edges, but is here shown on the right hand side, as viewed in Fig. 7.

It will be observed, by reference to Fig. 2, that the strip 118 is made shorter than the strips 100, 101 and 117. The only object of this is to 65 limit the friction of the parts, and this strip, on each guide, is made only as long as is necessary to secure proper movement of the slides.

In the adjusting means here shown (Fig. 7), the guide members 101, 117 and 118 are arranged 70 to be moved as a group toward and away from the cooperating tongue on the edge of plate 115. To this end, the cross bars 102 and 102' are each provided with an elongated slot 120, through which bolts or screws 121 run into or through the 75

members 101, 117 and 118; by loosening these screws or bolts 121, the grooved members may be readily moved toward the edge of the plate 115. The details of this adjustment are shown in Fig. 8, where a screw 122, for effecting movement of the grooved members, and a locknut 123 therefor, may be seen. By loosening the bolts 121, and turning the screw 122, sufficient adjustment may be readily made, whereupon the bolts 121 are again tightened; or by loosening screws 121 and backing out the screw 122, the grooved members may be moved away from the tongue so as to permit more freedom of action. Any other adjusting means may of course be used, and that shown is to be regarded as merely illustrative.

Operating mechanism

Normally the pin platform is held in raised position by the counterbalancing springs 22 and 26, the tension of which is so adjusted that they will raise the unloaded platform. But when a full complement of pins is on the platform, the tension of the springs is overcome, and the platform will descend of its own weight. After the pins shall have been deposited on the alley, the counterbalancing springs will raise the empty platform to normal position. But in actual operation, the platform may not always carry a full complement of pins, and under such circumstances manual aid to set the pins may be necessary. And again, at times automatic restoration of the platform to normal position may not be complete, and manual assistance is needed. To effect complete and satisfactory operation under all circumstances, a manual operating means, supplemental to the automatic means, is employed. This is best shown in Figs. 2, 4 and 7.

A handle bar 130 runs across the upper portion of the machine, where it can be conveniently grasped by the operator. This bar has extended ends 131, with or without rollers thereon, which normally rest on shoulders or wear plates 132 secured to the Z-bars of the side frames. Bars 133, one on either side of the machine, each have one end attached to the handle bar 130, and the other mounted with a sliding connection on the extension 96 of the bar 92. This sliding connection is merely an elongated slot 134 in the lower end 96 of the bar 92, by which this bar 133 may be moved a short distance with its bolt 135 in the slot 134. The purpose of this type of connection will be described below.

Each sliding side frame has rigidly attached thereto a cross guide, here shown as a channel bar 136, the construction of which is best shown in Fig. 7. These channel bars are secured to the slides by any suitable means, as by bolts 137. A flanged antifriction roller 138 is mounted to rotate on a bearing 139. These rollers are adapted to rotate on their bearings 139, and to move back and forth freely in the channel bars 136. While this cross guide is here shown as a channel bar with an antifriction roller therein, it is to be understood that any form of guide and movable cooperating member may be used.

Normally, the pin platform is retained in its raised position by the extensions 131 of the handle bar 130 resting on the supports or wear plates 132. After the pins shall have been placed on the platform, the handle bar 130 is grasped by the operator and drawn off the supports or wear plates 132, the bars 133 moving upwardly sufficiently by reason of the slots 134 in the lower ends of bars 92, and the antifriction rollers 138 moving slightly toward the operator in the chan-

nel bars 136. After the ends 131 of bar 130 shall have moved off their supports 132, the pin platform will move down, and the antifriction rollers 138 will move rearward. The handle bar 130 will, at this time, be describing the arc shown at B, Fig. 7, and the rollers 138, moving in the channel bars 136, will describe the arc shown at C. If the platform carries the full set of pins, the weight thereof will be sufficient to carry the platform down against the tension of the counterbalancing springs 22 and 26, and the pins will be automatically deposited on the alley; and the pin platform, being thus relieved of the weight of the pins, will be raised by the counterbalancing springs, and the handle bar 130, with its cooperating elements will be automatically positioned with its ends 131 on the supports 132. At the same time, the antifriction rollers 138 will move, in their channel bars, along the arc C. But if the platform does not carry a full complement of pins, as may often happen, the weight of the pins on the platform may not be sufficient to automatically deposit the pins, and some pressure must be applied by the operator on the handle bar 130 to complete the operation. Or, for some reason, even when a full set of pins is carried, automatic operation may not be effected, and in such cases additional pressure must be applied to the bar 130 to deposit the pins. Usually, the return of the platform is entirely automatic, but, if the automatic operation is not effected, a slight added effort on the part of the operator, through the handle bar 130, will lift the platform and position the operating bar on its supports.

Inasmuch as the pin platform and associated parts return to normal position under the influence of the counterbalancing springs 22 and 26, they move with considerable speed, and have substantial energy. To absorb this energy and bring the parts to rest properly, buffer springs are employed. The construction may be of any desired design, but as here disclosed, comprises springs 140, one on either side of the machine. These are set in holders 141, and are adjustably secured to frames 142 by means of adjusting rods 143 and nuts 144. Brackets 145, one on each sliding frame, are mounted on cross pieces 102 so as to strike the free ends of the springs on the upward movement of the slides. As the platform and slides move up under the influence of the counterbalancing springs 22 and 26, the brackets 145 strike the springs 140, the latter absorb the energy of the moving parts, and the machine is brought to rest with the platform in proper position, and with the extensions 131 of the handle bar 130 resting on the supports or wear plates 132.

It is to be understood of course that minor changes in construction are to be regarded as coming within the spirit of the invention.

I claim:

1. In a tenpin setting machine, the combination of a pin platform movable toward and away from the alley, frames one on either side of the machine each frame having two widely separated substantially vertical guiding means, sliding frames one for each side of the machine attached to the platform and each having two widely separated slides for cooperating with the guiding means on the frames, counterbalancing means for the pin platform, transverse guides one secured to each sliding frame, manual means for operating the pin platform, and antifriction devices carried by the manual operating means and movable in the transverse guides, whereby as

the manual operating mechanism is moved the platform will be lowered and raised by the anti-friction devices.

2. In a tenpin setting machine, the combination of a pin platform movable toward and away from the alley, frames one on either side of the machine each frame having two widely separated substantially vertical guiding means, sliding frames one for each side of the machine attached to the platform and each having two widely separated slides for cooperating with the guiding means on the frames, counterbalancing means for the pin platform, transverse guides one secured to each sliding frame, manual means for operating the pin platform, and cooperating devices carried by the manual operating means and movable with respect to the transverse guides, whereby as the manual operating mechanism is moved the platform will be lowered and raised by the cooperating devices.

3. In a pinsetting machine, the combination of a pin platform movable toward and away from the alley, frames one on either side of the machine having vertical guiding means, sliding frames one on each side of the machine attached to the platform and having guideways which cooperate with the guiding means on the frames, counterbalancing means for the pin platform, a manual operating means for operating the platform, transverse guides one secured to each sliding frame, bars each secured at one end to the manual operating means and at the other pivoted to some fixed part of the machine, means carried by the bars and cooperating with the transverse guides, whereby as the manual operating means is operated the platform will be lowered and raised by the means cooperating with the transverse guides.

4. In a pinsetting machine, the combination of a pin platform movable toward and away from the alley in a substantially vertical plane, means for guiding the platform in its vertical movements, transversely arranged guides mounted on the vertical guiding means, manual operating means comprising a handle movable toward and away from the alley, bars each secured at one

end to the handle and at the other end pivoted to some fixed part of the machine, and devices carried by the bars for cooperation with the transversely arranged guides, whereby movement of the handle toward and away from the alley will cause the devices carried by the bars to function with the transverse guides to lower and raise the platform.

5. In a pinsetting machine, the combination of a pin platform movable toward and away from the alley in a substantially vertical plane, means for guiding the platform in its vertical movements, transversely arranged channel bars mounted one on each vertical guiding means, manual operating means comprising a handle movable toward and away from the alley, bars each secured at one end to the handle and at the other pivoted with a movable connection to some fixed part of the machine, and antifriction rollers carried by the bars for cooperation with the channel bars, whereby movement of the handle toward and away from the alley will cause the antifriction rollers carried by the bars to cooperate with the channel bars and move the platform toward and away from the alley.

6. In a pinsetting machine, the combination of a pin platform movable toward and away from the alley, frames one for either side of the machine each frame having two widely separated substantially vertical guiding means, sliding frames one for each side of the machine attached to the platform and each having two widely separated slides for cooperating with the guiding means on the frames, counterbalancing means for the pin platform, transverse channel bars one secured to each sliding frame, manual means for operating the platform comprising a handle arranged transversely of the machine at the rear thereof, and antifriction rollers carried by the manual operating means and movable in the transverse channel bars, whereby as the manual operating mechanism is operated the platform will be lowered and raised by the antifriction rollers.

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