

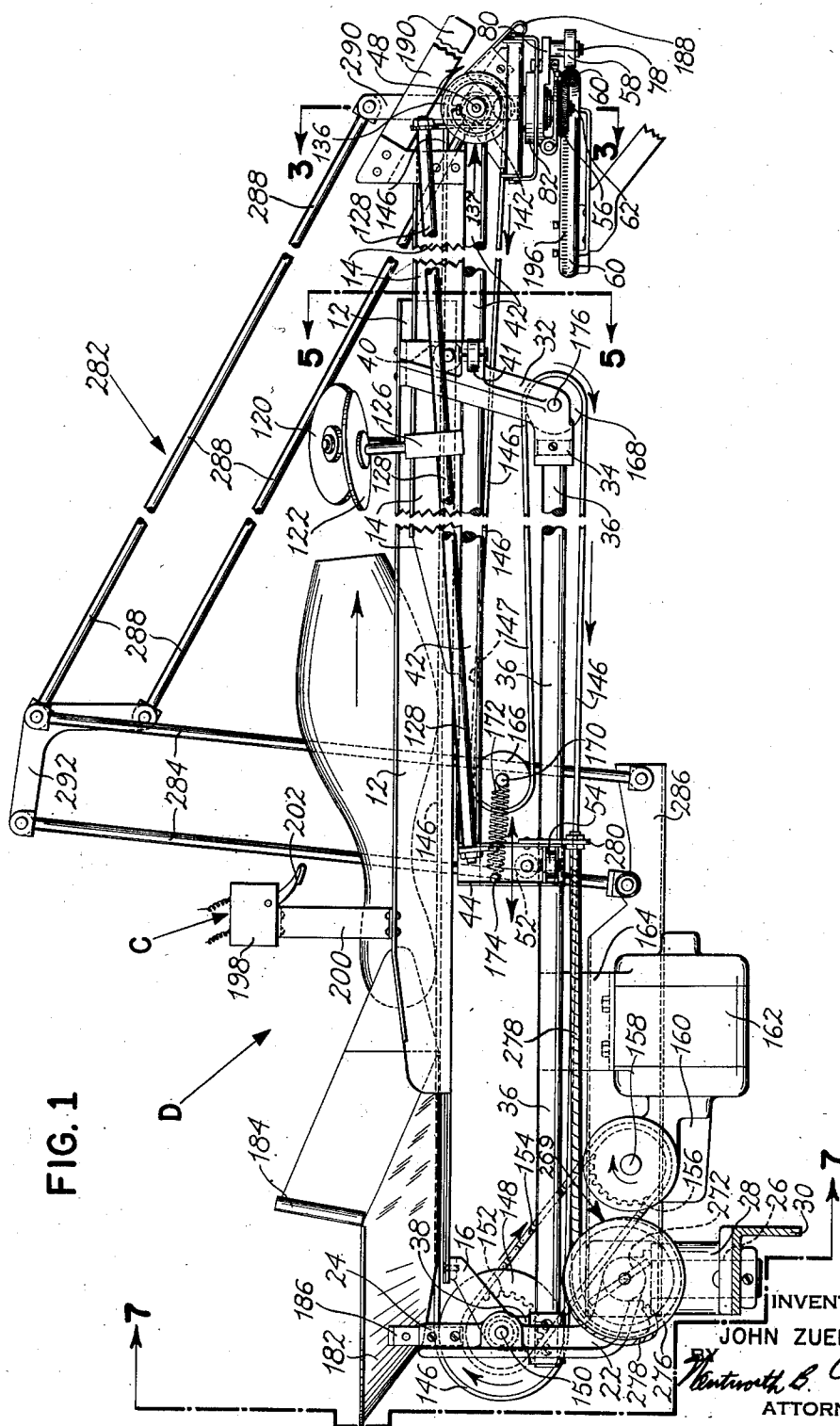
Oct. 23, 1956

**J. ZUERCHER**  
PIN DISTRIBUTING AND SPOTTING MECHANISM  
FOR BOWLING PIN SPOTTING MACHINES

**2,767,984**

Filed Aug. 11, 1950

7 Sheets-Sheet 1





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FIG. 3

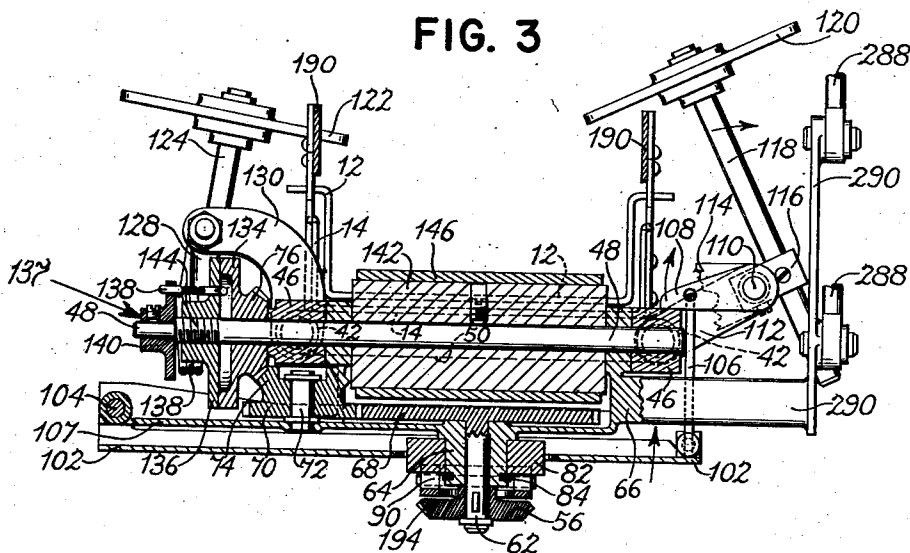


FIG. 4

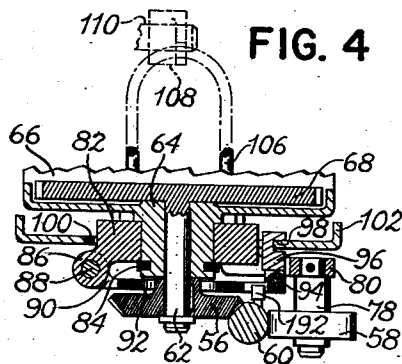
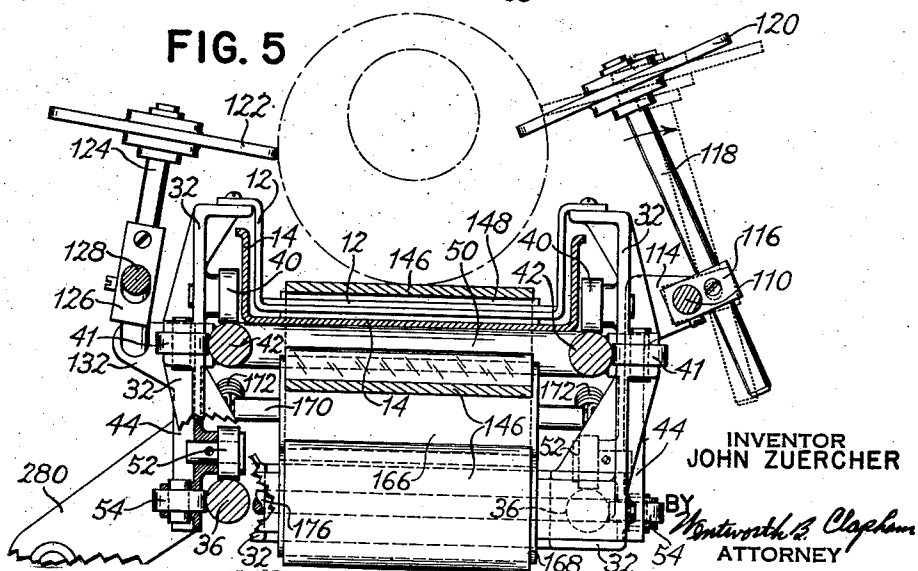


FIG. 5



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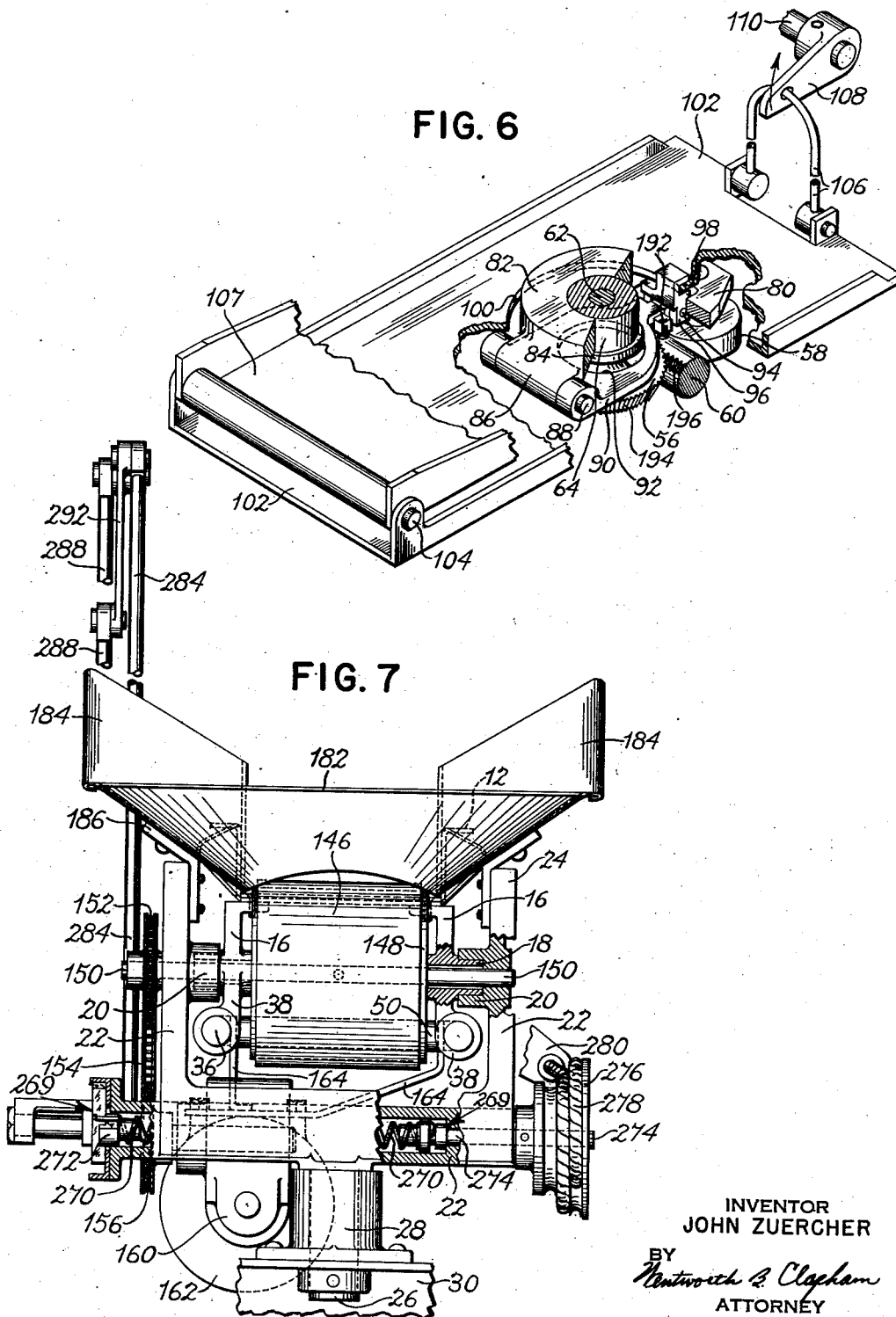
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Oct. 23, 1956

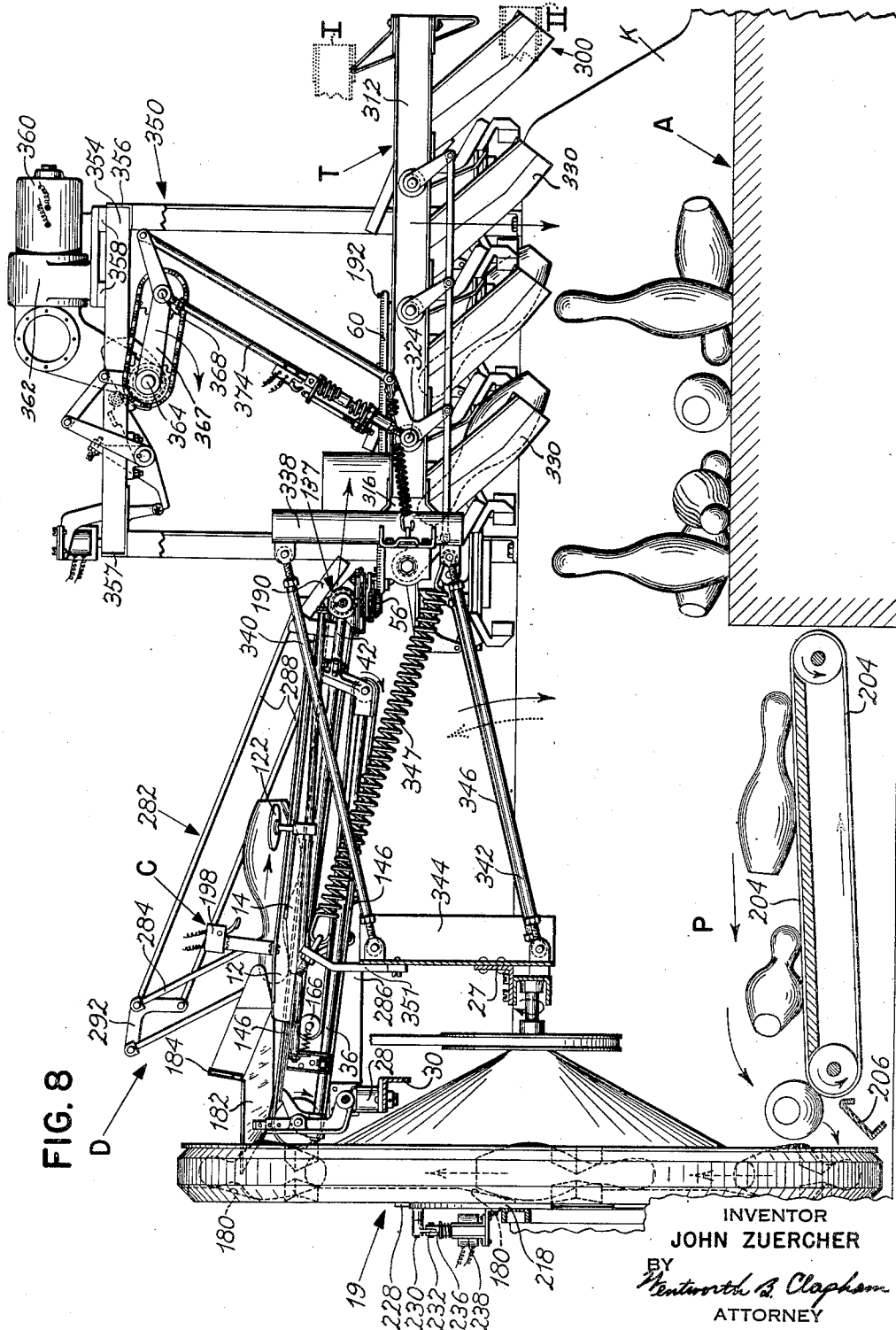
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FIG. 8





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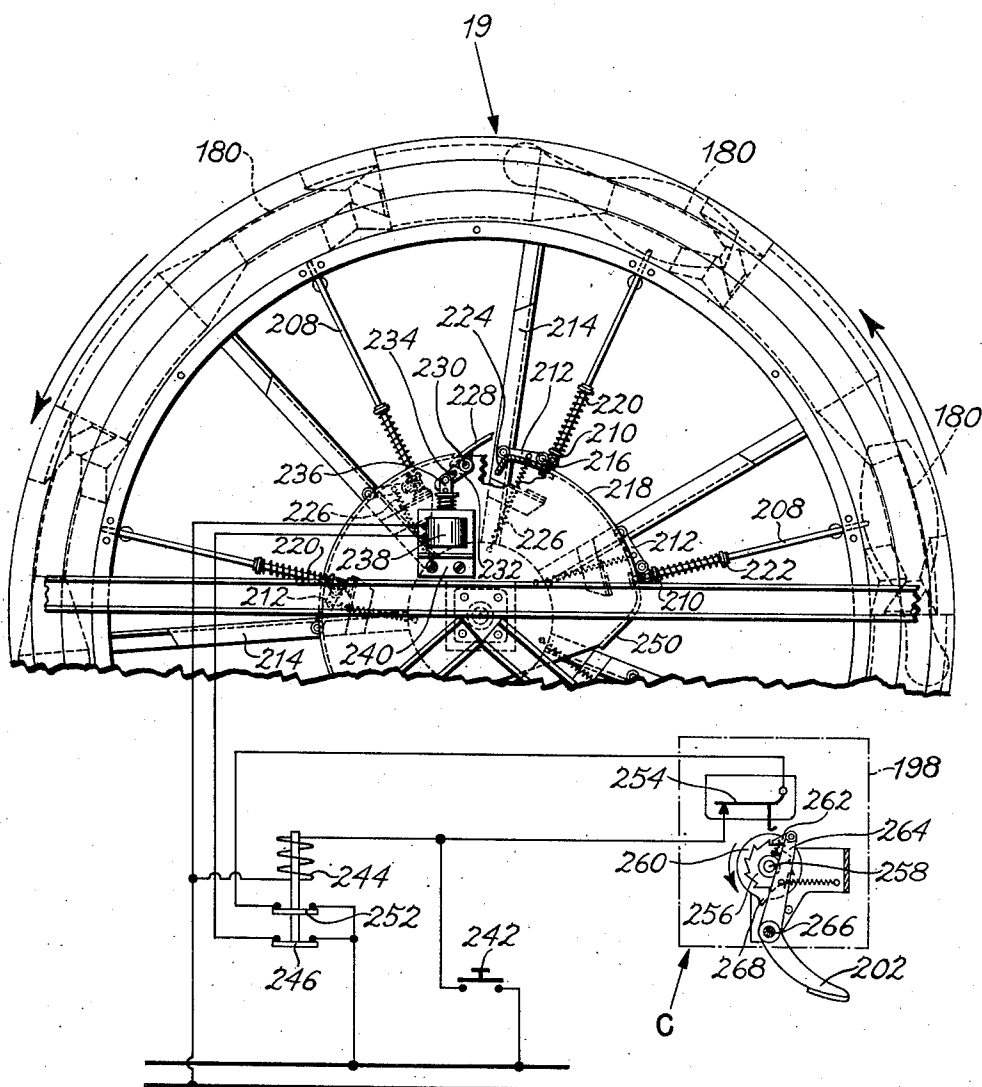
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FIG. 10



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2,767,984

## PIN DISTRIBUTING AND SPOTTING MECHANISM FOR BOWLING PIN SPOTTING MACHINES

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Application August 11, 1950, Serial No. 178,777

50 Claims. (Cl. 273—43)

This invention relates to bowling pin spotting machines, and more particularly to improvements in mechanism for effecting controlled, automatic and rapid delivery of a succession or predetermined number of bowling pins to the pin spotting device of a bowling pin spotting machine.

In a bowling pin spotting machine embodying the invention, bowling pins are removed from the pit of a bowling alley and delivered one by one to the novel pin distributing device which in turn delivers them one by one into spotter units mounted in a prearranged pattern on a pin spotting and respotting table. The novel pin distributing mechanism which includes a swivel support at one end, is formed with two telescoping U-shaped members such that when the distributor is moved or swung laterally across the machine and upwardly and downwardly, the telescoping chute members are extended or retracted as desired according to the particular pin spotting unit to which a bowling pin is to be delivered. The distributor is provided with pin controlled trip actuating mechanism such that when one spotter unit has received a pin, the next pin advanced by a conveyor belt lying in the bottom of the channel formed by the telescoping chute members, will cause an indexing operation and the distributor will move automatically to a delivery position adjacent the next empty spotter unit selected to receive a pin. The mounting of the chute members and the endless conveyor belt is such that the endless conveyor belt is automatically taken up or let out in accordance with the outward or inward movement of the chute members.

The mechanism described above solves many problems which arise in the expeditious handling and distribution of bowling pins in a bowling pin spotting machine. It makes possible rapid and controlled movement of pins from the pit of a bowling alley and their distribution in a pin spotter. The mechanism is simple in construction and positive in action. Its use also speeds up the game because of the manner in which it effects the continuous delivery of pins to the spotter units on the spotting and respotting table, not only when the table is stationary, but also during movement of the table from and to an alley bed. Also whenever the several spotter units on the table contain pins, although the endless conveyor belt of the distributor continues to operate, control mechanism is provided which interrupts further movement of the distributor, and prevents the delivery of pins thereto, until the pins in the spotter units have been placed upon the alley bed, and the empty spotter units have been readied for receiving pins.

It is an object of the invention to provide a novel bowling pin distributing mechanism in which bowling pins are delivered one by one to pin spotter units by an elongated distributor mounted at one end for lateral swinging movement, and having pins engaging and conveying members which can be moved in and out, like the parts of a slide trombone, in order to locate the discharge end of the distributor at predetermined posi-

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tions adjacent the spotting units, and effect the controlled delivery of bowling pins into empty pin spotting units.

It is also an object of the invention to provide an improved bowling pin distributing device having one end swivelly attached to a suitable support and a device for effecting lateral and longitudinal movement of its pin discharge end to effect the proper delivery of pins to empty pin spotting units on a pin spotter.

It is also an object of the invention to provide an improved pin spotting machine having novel pin distributing mechanism in which the distributing mechanism has two interconnected members which can be advanced and retracted concurrently with the lateral movement of the distributor mechanism in order to effect the delivery of a plurality of pins by one to a pin spotter.

The invention is also characterized by a device for feeding pins one by one to a pin spotter, and mechanism coacting therewith for stopping the feed of pins to or from the device until there is a need for additional pins in the spotter.

The invention also consists of a pin spotting table movable to and from a bowling alley which supports a track having means coacting with the pin delivery end of a pin distributor mounted for lateral, longitudinal and vertical movements in order that bowling pins may be delivered into spotting units carried by the table not only when the table is stationary, but also when it is moving vertically to and from the playing bed of a bowling alley.

It is a further object of the invention to provide an elongated distributor which is swivelly mounted at one end having a conveyor for delivering pins in succession to pin spotting units, and controlled driving means for swinging the free end of the distributor into position to deliver pins to empty spotter units.

With these and other objects not specifically mentioned in view, the invention consists in certain combinations and constructions which will be fully described hereinafter, and then set forth in the claims hereunto appended.

In the accompanying drawings which form a part of this specification, and in which like characters of reference indicate the same or like parts:

Figure 1 is a side elevation of a preferred form of pin distributor embodying the invention;

Figure 2 is a plan view of the same;

Figure 3 is a sectional end elevation of the delivery end of the pin distributor, taken on line 3—3 of Figure 1;

Figure 4 is a sectional side elevation of the pin distributor indexing mechanism, taken on line 4—4 of Figure 2;

Figure 5 is a sectional end elevation of the delivery chute, taken on line 5—5 of Figure 1;

Figure 6 is an isometric view illustrating the indexing device operating mechanism;

Figure 7 is an end elevation of the pin distributor as seen from line 7—7 of Figure 1;

Figure 8 is a side elevation of the pin distributor in conjunction with an automatic bowling pin setting machine illustrating generally the manner in which pins are delivered by the distributor to the bowling pin setting table;

Figure 9 is a partial plan view of the pin distributor in conjunction with the pin setter table of an automatic bowling machine, illustrating the cam track which controls the path of travel of the distributor during delivery of pins to the pin spotting units on the table; and

Figure 10 is a partial rear view of the bowling pin elevator illustrating the pin clamping and release mechanism of the same and the control therefor.

With reference to the drawings, the pin distributor D, which is quickly detachably mounted for removal as for repairs or replacement, consists of a pair of U-shaped pin guide chutes 12 and 14 (Figures 1, 2, 3 and 5), slidably arranged in a telescopic fashion to provide a guide chute which is automatically extended or retracted depending upon which of the triangularly arranged pockets 300 of the pin setter table is receiving a pin from distributor D.

Guide chute 12 at one end is secured to a pair of spaced brackets 16, each of which (see Figure 7) is provided with an extending hub 18, rotatably supported by a suitable bearing 20 of a frame bracket 22. The latter, as illustrated in Figure 7, is of a substantially U-shaped design. Each of its two vertical arms 24 is provided with a bearing 20. Centrally between the two upright arms 24, but extending downwardly from its lower portion, is provided a stud 26, preferably formed integrally therewith, which is rotatably supported in a vertical bearing 28, the upper face of which also supports frame bracket 22. Bearing 28 is secured to a horizontal cross member 30 of the machine frame.

The other end of chute or guide channel 12 is secured to the upper portion of a U-shaped member 32 (Figures 1, 2 and 5), the lower portion of the latter being provided with a pair of hubs 34 each of which supports one end of a rod 36, the other end of each rod 36 being rigidly connected to a lug 38 forming an integral part of its respective bracket 16. Pivotaly mounted on the inner side of each upright arm of U-shaped member 32 is a roller 40. Each roller 40 contacts and is adapted to roll upon the top edge of a horizontal rod 42, of which there are two, one at each side of chute 12. One end of each rod 42 is rigidly secured to a vertical bracket 44; the other end of each rod 42 is provided with a lug 46 (Figures 2 and 3) pivotally connected to horizontal shaft 48. Rods 42 are also connected to each other by means of a pair of tie rods 50, employed for the purpose of maintaining rods 42 parallel to each other and also to provide a support for pin guide channel 14, which is secured thereto. The inner side of each bracket 44 is provided with a roller 52 adapted to rest upon and roll along the top edge of one of the rods 36. This arrangement provides a support for the rear end of rods 42 and pin guide chute 14. For the purpose of proper guidance, each bracket 44 is also equipped with a guide roller 54 (Figs. 1, 2 and 5), each of which engages the side edge of its respective rod 36.

The front or pin delivery end of distributor D which includes the front end of chute 14, is provided with mechanism supporting it for lateral movement across the machine and also longitudinal movement along a predetermined path of travel as the free end of distributor D is moved from one spotting unit 300 to the next unit 300 until all are filled with pins. It is also provided with mechanism, described hereinafter, which is operated at the proper time during the discharge of pins from chute 14 to effect the desired movement of distributor D in delivering pins to each spotting unit 300.

In the illustrated embodiment, the front end of distributor D is supported and guided by means of a driving member, such as a bevelled disc 56, and a guide roller 58, both of which engage with a horizontal track 60 suitably mounted on pin setter table T, as described hereinafter. Bevelled disc 56 which engages and runs on the outer face of track 60, is keyed to a vertical stud 62, see Fig. 3, rotatably supported by hub 64 of distributor front bearing member 66. Stud 62 in the illustrated embodiment forms an integral part of a gear 68 which meshes with gear 70 loosely mounted on a stud 72 secured to bearing member 66. Integral with gear 70 (Fig. 3) is bevel gear 74 which meshes with a bevel gear 76 loosely mounted on horizontal shaft 48 supported in suitable bearing lugs of member 66. Guide roller 58, mentioned above, is rotatably mounted on vertical stud 78 (Figs. 1, 4 and 6) held by lug 80 projecting from and forming a part of swivel

member 82. The latter is rotatably supported by hub 64 of bearing member 66, and retainer ring 84. Swivel member 82 is also provided with a lug 86 (Figs. 4 and 6), which carries pin 88 to which is pivoted a hinge member 90. The latter is provided with a circular cut-out or opening 92 through which extends the hub of bevelled disc 56. The free end of hinge member 90 is provided with an extension which carries a pin 94 to which is pivoted the lower portion of a link member 96. The upper portion of the latter is provided with a slot 98 which slidably engages with the inner edges of a circular hole or cut-out 100 of a hinge plate 102. The circular hole 100 of plate 102 is concentric with stud 62 and hub 64 so that link member 96 always remains in engagement with plate 102 when swivel member 82, to which hinge member 90 is pivoted, rotates about hub 64 of bearing member 66.

Hinge plate 102 at one end is pivoted to stud 104 held by a suitably shaped flange 107 forming an integral part of and projecting from bearing member 66. The free end of hinge plate 102 is pivotally attached to U-shaped link 106 connected to arm 108 attached to shaft 110. This shaft is supported by suitable longitudinally spaced bearing lugs 112 and 114, which are secured to one of the lugs 46 and one of the brackets 44, respectively. On shaft 110 is adjustably mounted a lug 116 to which is clamped one end of rod 118 on the upper free end of which is supported a pin engaged trip member. In the illustrated embodiment this member consists of a rotatable disc 120, which projects into pin guide chute 12 where it is engaged by each bowling pin passing through chutes 12 and 14 for delivery to spotting units 300. Opposite trip member 120 at the other side of chute 12 there is provided a coacting guide member, such as guide roller or disc 122 which extends into chute 12. Disc 122 is rotatably mounted upon the upper end of a rod 124 secured to a lug 126 adjustably mounted on rod 128 rigidly held in a pair of lugs 130 and 132 secured to the other of the lugs 46 and the other of the brackets 44, respectively.

Gear 76 is loosely mounted on shaft 48 (Fig. 3) and provides driving means for driving member or bevelled disc 56 as mentioned above. Gear 76 is provided with an annular flange 134 which, during driving operation, is in frictional engagement with a clutch disc 136, which by means of spring 138 encircling the hub of clutch disc 136, is connected to flange 140 adjustably secured to the end of shaft 48. The bore of the hub of clutch disc 136 is threaded and freely engages with a threaded portion 144 of shaft 48. Shaft 48 preferably is driven by pulley 142 mounted thereon. Pulley 142 is driven continuously by means of pin conveyor belt 146 from pulley 148 mounted on shaft 150 supported in suitable bearings in frame bracket 22. On shaft 150 is mounted sprocket 152, which through a chain 154, is driven by sprocket 156 on continuously driven shaft 158 protruding from housing 160 of gear reduction motor 162. The latter is supported by a suitable motor bracket 164 rigidly attached to rods 36. Belt 146 which provides the means for conveying a succession of bowling pins through chutes 12 and 14 of distributor D, is led from pulley 148 to pulley 142 over the bottom of the U-shaped channel formed by guide chutes 12 and 14, and is guided over tension roller 166, and guide roller 168 (Fig. 1).

Tension roller 166 is freely mounted and floatingly supported on stud 170 and a pair of tension springs 172 attached to the ends of stud 170 and to pins 174 in brackets 44. Guide roller 168 is freely mounted on stud 176 supported by U-shaped member 32.

Pin distributor D is designed for the purpose of conveying bowling pins delivered thereto from a suitable pin elevating mechanism, such as a pin elevator 19 to the pinspotting units or receptacles 300 carried by a pin spotter table, designated generally T (Figs. 8 and 9). Pin elevator 19, illustrated in Fig. 8 may be similar in design and construction to that shown and described in co-pending application Serial No. 150,-

232, filed March 17, 1950 for Bowling Pin Elevating Mechanism by R. L. Holloway and John Zuercher. Since the pin elevating mechanism does not form a specific part of the invention, only so much is shown and described as will enable the operations involved in effecting the delivery of pins to distributor D to be understood. Further showing is omitted in the interests of brevity. The mechanism which supports bevel disc 56 in operative driving relationship with track 60 insures that at all times during the movement of table T to and from alley bed A, stud 62 will be maintained substantially at right angles to the plane of track 60. This arrangement makes possible the securing of an important and novel result, i. e. it makes possible the delivery of bowling pins in proper manner and order into empty spotter units 300, not only when table T is stationary, but also when it is moving to and from alley bed A. In this way, a great saving in time results in the operating cycle of the machine.

During pin delivery operation, bowling pins are elevated by and released from suitable pockets 180 of the pin elevator 19 as each pin loaded pocket 180 passes the receiving end of distributor D. Each released pin drops into receiving chute 182 which extends partly into elevator 19 and is guided onto pin conveyor belt 146 which runs upon the bottom of the U-shaped pin guide channel formed by chutes 12 and 14, as stated above. Since it is essential that all pins delivered to pinspotting units 300 of table T be deposited on conveyor belt 146 butt end first, each side of receiving chute 182 is provided with an upright pin guide member 184. If a pin is released from a pocket 180 and moves with its handle end towards conveyor belt 146, the handle end thereof engages with and rests against one of the guide members 184. Substantially simultaneously therewith the belly portion of the pin rolls onto belt 146 and is advanced thereby. This movement of the belly portion of the pin, while the handle portion rests against a guide member 184, causes the pin to be turned or oriented for butt end foremost delivery to a pin spotting unit 300. Due to the position each pin occupies in a pocket 180 of pin elevating member 19, all pins released therefrom are positioned with their longitudinal axes substantially at right angles to the longitudinal axis of distributor D. Receiving chute 182 is secured by means of brackets 186 to upright members 24 of frame bracket 22. After a pin is oriented and positioned butt end foremost on conveyor belt 146, the latter carries it to the delivery end of distributor D whence it is deposited butt first into one of the pin spotting units 300 of table T. In order to guide each pin properly from distributor D into the pin spotting units 300, at its delivery end distributor D, is provided with an inclined guide plate 188 suitably secured to front bearing member 66. In addition to bottom guide plate 188, there are provided two spaced side guide members 190, one at each side of chute 14, each of which is attached in any suitable manner to the front end of one of the side walls of chute 14.

Since the pin spotter units 300 in table T are arranged in substantially the same pattern in which the pins are placed on the alley, such as the conventional triangular arrangement, horizontal cam track 60, which is carried by the table and which guides the distributor to and past all pin spotting units 300, is of generally heart-shaped design (Fig. 9). Track 60 is provided with a number of stop pins 192 corresponding to the number of pin spotter units 300 on table T. Each stop pin 192 projects vertically from the top edge of cam track 60 and adjacent one of the pin spotter units 300. Stop pins 192 are provided for the purpose of arresting the movement of distributor D at each pin spotter unit while travelling along cam track 60 in delivering a pin into each pin spotter unit 300 of table T. As illustrated, the lateral and concurrent telescoping movement of distributor D is anti-clockwise, as viewed in Figure 9. The direction of movement could, however, be in the opposite direction. Cam

60 is designed in such a way that the distributor delivers pins to the ten pin spotter units 300 in the following order: The first pin is delivered to units #9, the second to unit #5, the third to unit #8, the fourth to unit #7, the fifth to unit #4, the sixth to unit #2, the seventh to unit #1, the eighth to unit #3, the ninth to unit #6, and the tenth to unit #10. It will be noted that in serving each of the spotter units, the front end of distributor D is extended and retracted in a manner similar to the movement of the parts of a slide trombone.

The intermittent movement of the distributor on track 60 from one unit to the next is accomplished in the following manner: As mentioned heretofore, the drive for the front end of the distributor on track 60 is obtained through continuously driven pin conveyor belt 146 which, through pulley 142, continuously rotates shaft 48 having attached thereto flange 140 which, through torque spring 138, drives clutch disc 136. The latter, as mentioned heretofore, is in frictional engagement with annular flange 134 of bevel gear 76 by virtue of threaded portion 144 of shaft 48, as described hereinafter, which effects the driving of bevel disc 56. The latter, for better traction, is provided on its bevelled surface with teeth or knurls 194 which engage with teeth or knurls 196 on track 60. Without the stop pins 192 on track 60 adjacent each pin-spotter unit 300, the front end of distributor D would be driven continuously around track 60. However, in normal position, hinge member 90, which bridges track 60, lies close to the top surface of the same and its notched out front edge contacts each stop pin 192 in succession, causing the arrest of the front end of the distributor D until the next pin advanced by conveyor belt 146 moves trip member 120 upwardly, and through the connections described above, hinge member 90 is moved out of engagement with a stop 192, thus allowing bevel disc 56 to be driven in order to effect the movement of the discharge end of distributor D to the next empty unit 300.

When the movement of distributor D is stopped, bevel disc 56 is also stopped. However, since conveyor belt 146, shaft 48, and flange 140 are driven continuously, by means of torque spring 138 which is connected to flange 140 and to clutch disc 136 threadably supported on threaded portion 144 of shaft 48, clutch flange 134 and clutch disc 136 remain in frictional engagement under a constant torque limited by the action of spring 138 and the movement of disc 136 upon threaded portion 144 of shaft 48. Therefore, although at this time rotation of bevel gear 76 is stopped, the clutch mechanism is maintained ready at constant torque to drive bevel gear 76, and hence bevel disc 56 as soon as member 90 is moved out of engagement with a stop 192. The front end of the distributor remains motionless insofar as its movement along track 60 is concerned, until a bowling pin, advanced by pin conveyor belt 146, passes between the guide disc 122 and trip member or disc 120, causing the latter to swing or move outwardly thereby rocking rod 118, as illustrated in dotted position in Figure 5. This rocking movement of rod 118 causes shaft 110 to turn and move arm 108 upwardly, thereby lifting the free end of hinge plate 102, which is connected to arm 108 by link 106 (Figure 6). Since hinge plate 102 is connected to hinge member 90 by link member 96, an upward motion of plate 102 will also cause an upward movement of hinge member 90 and effect a disengagement of the notched portion of hinge member 90 from the stop 192 which presently arrests the movement of distributor D. With no obstruction restraining bevel disc 56, clutch disc 136 fully re-engages with flange 134 of bevel gear 76, causing the front end of distributor D to be driven along track 60 until re-arrested by the stop 192 adjacent the next empty pin spotter unit 300 in table T, where the bowling pin which effected the release of distributor D from its arrested position against a stop pin 192, is deposited in receptacle 330 of the pin spotter unit 300 in question. Thus,

one unit 300 after another is supplied with a pin until the receptacles 330 of all ten units 300 are filled.

In order to prevent the delivery of more than ten pins by distributor D after all pin spotter units 300 of table T are filled, a counter C is provided. See Figures 1, 2, 8 and 10. Counter C is enclosed in a suitable housing 198 held by a bridge bracket 200 secured to the top edges of pin guide chute 12. A trip finger 202, projecting from housing 198, extends into the path of pins in chute 12 and, as each pin passes underneath counter C, the belly portion of each pin contacts and trips finger 202.

As mentioned heretofore, bowling pins are elevated from pit P and deposited in pin receiving chute 182 of the distributor by means of a mechanism which may be similar in construction and operation to that shown and described in copending application, Serial Number 150,-232. Bowling pins are conveyed from pit P by continuously moving, endless conveyor 204, onto a transverse guide plate 206 which guides them into the several pockets 180 of conveyor 19 (Fig. 8). Since the construction and operation of the operating means for each pocket are identical, only one is described briefly below. After a pin is properly seated in a pocket 180, it is clamped therein by the free end of a rod 208 associated therewith. The bottom end of rod 208 is yieldingly supported by a suitable sleeve lug 210 connected to a cam lever 212 pivoted to a radial rib 214 of the conveyor drum. Cam lever 212 carries a cam roller 216 which, when engaging with a stationary cam track 218, causes rod 208, through sleeve lug 210, a spring 220 and a collar 222, to move outward and effect a clamping action of the free end of rod 208 upon the belly portion of a pin in a pocket 180. Any pin in a pocket 180 will remain clamped therein by its respective rod 208 so long as its respective cam roller 216 rides on the top surface of the cam 218. In order to effect the release of a pin from a pocket when reaching a position adjacent receiving trough 182 of distributor D, cam 218 is provided with a gap 224 into which cam roller 216 drops, causing cam lever 212, urged by a tension spring 226, to release the free end of rod 208 from engagement with a pin in a pocket 180, and the pin rolls out of its pocket 180 and into pin receiving trough 182 of distributor D. However, as mentioned heretofore, when ten pins have been forwarded to the pinspotter units 300 of table T, it is essential that no additional pins be delivered by the distributor to table T and mechanism is provided for interrupting the flow of pins until such time when pins are again needed in table T. A suitable mechanism may be that shown in Figure 10 in which control means are provided such that in the operation of the machine any pins which still may be in pin elevator 19, are retained therein until the set of pins carried by pinspotter units 300 have been spotted on alley bed A, and the empty units 300 are ready to receive a new set of pins.

In order to prevent pins carried in the pockets 180 of the elevator from being released for delivery into receiving trough 182, a bridge plate 228 is moved across the gap 224 in cam 218 thus preventing each cam lever 212 and roller 216 from dropping into said gap thereby maintaining rods 208 in engagement with pins in pockets 180 when passing the pin receiving trough 182. These pins will be held in said pockets until bridge plate 228 swings upwardly and again opens gap 224 in cam 218.

Bridge plate 228 is mounted on a short shaft 230 to which is secured an operating lever 232 provided with a slot 234 which engages with a pin of an extension 236 of the armature of solenoid 238 secured to bracket 240 suitably mounted on cam 218.

Under normal operation, solenoid 238 is de-energized and bridge plate 228 is closed except when it is desired to fill pin spotter units 300 with pins. To achieve this object, the player presses a push button 242 (Figure 10). This causes the energization of relay 244 closing contact 246, which actuates solenoid 238. Armature 236 of solenoid 238 is caused to move downwardly which rocks oper-

ating lever 232, and causes bridge plate 228 to swing upwardly, thereby opening gap 224 in cam 218. This enables all cam levers 212 and rollers 216 to drop into gap 224 and effect the release of rods 208 from pins held thereby in pockets 180, as mentioned above.

Due to the continuous rotation of elevator 19, after dropping into gap 224, levers 212 and rollers 216, ride underneath cam 218 until they arrive again at an inclined apron 250 which guides them onto the top of cam 218.

Since the pressing of push button 242 by a player would only provide a temporary energization of relay 244, the latter is provided with a hold-in contact 252 connected to trip switch 254 mounted in housing 198 of counter C. The latter is provided with a ten tooth ratchet 256 mounted on a shaft 258 to which is also secured one-tooth trip cam 260. Ratchet 256 is actuated by means of spring mounted pawl 262 pivoted to ratchet lever 264 mounted on stud shaft 266 to which is also secured pin actuated trip finger 202. Each pin moving past trip finger 202, raises it, thereby advancing ratchet 256 one tooth. A nose 268 on trip cam 260, which turns intermittently with said ratchet, is so arranged that it will trip switch 254 when the tenth pin passes trip finger 202. The tripping of normally closed switch 254 causes momentary opening of the same, which breaks the circuit and causes relay 244 to drop out. The dropping out of relay 244 results in the closing of gap 224 of cam 218 by bridge plate 228, assuring that no pins will be released from pockets 180 of rotary pin elevator 19 into the distributor until button 242 is pressed again by a player.

As mentioned heretofore, the free end of distributor D while moving on the heart-shaped track 60 to deliver pins to the ten pin spotter units 300 of table T extends and retracts in a fashion similar to a trombone. The pin receiving end is pivoted about vertical stud 26 while the front or delivery end moves upon and along track 60. Pin guide chute 14 telescopes inwardly and outwardly beneath the chute 12, and its two rear supporting brackets 44 are guided freely by means of rollers 52 and 54 riding on the two parallel rods 36, the front ends of which are secured to U-shaped member 32, which by means of rollers 40 and 41, is slidably supported on reciprocating rods 42 secured to the front end of distributor D. Since tension roller 166 is floatingly mounted on brackets 44, loop 147 formed in belt 146 by roller 166 is automatically lengthened or shortened during the extension or retraction of the distributor. In this manner, roller 166 provides constant tension in belt 146 and compensates for belt stretch during the operation of distributor D as the pin conveying run of belt 146 between pulleys 142 and 148 is lengthened and shortened as chute 14 is moved outwardly or inwardly relative to fixed chute 12. Due to the fact that springs 172 are attached to brackets 44 which roll upon rods 36, the tension in springs 172 is maintained substantially constant.

In order to insure proper movement of the front end of distributor D along track 60, a counterbalancing device, designated generally 269, is provided. This device is provided in order to balance out the system of forces of the operating mechanism of distributor D. It coacts with the belt driving means including clutch 137 such that the driving force of clutch 137 is substantially constant regardless of the direction of movement and position of chute 14 of distributor D as it moves along track 60. By the use of this device, regardless of the position of the front end of distributor D on track 60, it is always moved properly therealong in delivering pins to the several spotter units 300. In the embodiment selected for purposes of illustration, counter balancing device 269 includes an adjustable torsion spring 270, Figures 2 and 7. The latter is supported in the lower portion of frame bracket 22. One end of spring 270 is anchored to an adjustable key 272; its other end is secured to stud shaft 274 supported in a suitable bearing of bracket 22. Also secured to stud shaft 274 is a spiral pulley 276 to which is attached one

end of a rope or cable 278, the other end of which is secured to lug 280 mounted on one of the brackets 44. The operation is such that during the extension of the front end of the distributor, the spring is wound up by cable 278 and thus counterbalances the extension forces mentioned above.

Since the distributor is designed to deliver pins to the several pin spotter units 300, not only when table T is stationary, but also during its movements, there is provided a parallelogram 282 which maintains the free end of the distributor, or that part which supports bevel disc or driving member 56, in a horizontal position at all times although the U-shaped pin delivery channel comprising chutes 12 and 14 may at times during the operation of the machine be disposed in an inclined position. Parallelogram 282 includes a pair of rods 284 pivoted to a horizontal, stationary arm 286 which projects from and is mounted on bracket 22. The other pair of rods 288 is pivoted to a vertical member 290 which forms an integral part of the distributor front bearing member 66. Both pairs of rods 284 and 288 are pivotally interconnected at a bell crank lever 292. The receiving trough 182 being mounted on frame member 22 always remains in horizontal position while the receiving end of the conveyor is horizontally pivoted by means of hubs 18 of brackets 16 journaled in bearings 20 in bracket member 22.

Table T is moved to and from alley bed A in order to spot pins held in spotter units 300, and as stated hereinabove, during the movement of table T and also when table T is held stationary or in a dwell position above alley bed A, pins are delivered into empty units 300 by distributor D. The mechanism for operating table T, including means for moving it to and from alley bed A, may be similar in construction and operation to that shown and described in co-pending application S. N. 180,174, filed August 18, 1950, by R. L. Holloway, T. J. Bohm, J. Zuercher and L. Strauss. Since this structure does not form a specific part of the present invention, there is described herein only so much of a table actuating mechanism as is deemed necessary to an understanding of its coaction with distributor D.

Table T is supported above alley bed A, as shown in Figure 8, by a frame including spaced side frames 350 attached to kickbacks K and longitudinal frame members 354 secured thereto. Side frames 350 are connected together by cross members 356, 357. Attached to members 354 are cross strips 358 on which is mounted a motor 360 which is operated by suitable means (not shown) to move table T to and from alley bed A. Motor 360 is provided with a conventional gear reduction mechanism enclosed in housing 362 which drives shaft 364 through a suitable clutch (not shown) at a desired rate of speed. Attached to shaft 364 is an operating arm 367. The free end of arm 367 is provided with a stud shaft 368 to which is pivotally connected a link 374, the latter being connected at its other end to a cross shaft 324 journaled in bearings in frame members 312 of table T. By means of these operating connections when motor 360 is operating and the clutch is thrown in, table T is moved from position I to position II adjacent alley bed A and back to position I.

Table T is so mounted and stabilized that it is maintained in a substantially horizontal parallel relationship with alley bed A at all times. For this purpose, brackets 316 attached to the rear ends of table frame members 312 are formed with an extension 338 to which are pivotally connected upper and lower radius rods 340, 342, respectively. Radius rods 340, 342, also are connected to supports 344 on frame cross member 27. Connected to brackets 316 in any suitable manner are stabilizing arms 346, the latter also being pivotally connected to brackets attached to cross frame member 27. Springs 347, each having one end attached to an extension 338 and the other end secured to a bracket 351 on support 344, bal-

ance the weight of table T and assist in insuring its smooth movement to and from alley bed A. As shown in Figures 8 and 9, rods 340, 342 and 346 are provided at their ends with adjustable connections. This arrangement provides means for adjusting the position of table T laterally, diagonally, and up and down, as desired, in order to effect proper delivery of pins on alley bed A. In the operation of distributor D in association with the pin delivery mechanism shown in Figure 8, delivery of pins to receiving chute 182 from pin elevating device 19 is such that all pins carried on belt 146 are substantially equally spaced. This insures against clogging and jamming, and accordingly results in the greatly improved delivery of pins to units 300. If for any reason a pin should be absent from a pocket 180 of pin elevating device 19, the next pin delivered onto belt 146 will be carried thereon spaced twice the distance of the last pin conveyed by belt 146. As soon as a new set of pins has been placed on alley bed A, the empty spotter units 300 are returned to pin receiving position ready for delivery of pins thereto by distributor D. If push button 242 is operated, pins will begin moving from elevating mechanism 19 through distributor D into empty spotter units 300. The operation of distributor D then continues so long as a pin spotter unit 300 remains empty.

The above described invention may be varied in construction within the scope of the claims, for the particular device, selected to illustrate the invention, is but one of many possible concrete embodiments of the same. It is not therefore to be restricted to the precise details of the structure shown and described.

#### I claim:

1. In a bowling pin spotting machine, a pin elevating device for raising bowling pins from the pit of a bowling alley, a pin spotter, a plurality of pin spotting units mounted in substantially triangular arrangement on said spotter, an extensible distributor for receiving pins from said device and delivering said pins one by one to said spotter, means for moving said distributor transversely of said machine and simultaneously therewith extending and retracting said distributor relative to each of said substantially triangularly arranged units to effect the delivery of a bowling pin into each empty unit.

2. In a bowling pin spotting machine, a pin elevating device for raising pins from the pit of a bowling alley, a pin spotter, a plurality of substantially triangularly arranged pin spotter units carried by said spotter, a distributor extending between said device and said spotter, mechanism for moving said spotter to and from the playing bed of an alley to spot and re-spot pins thereon, means connecting said distributor to said spotter for movement therewith, and means operative simultaneously with the movement of said spotter for moving said distributor also in a path substantially at right angles to the path of travel of said spotter to deliver pins to said units.

3. In a bowling pin spotting machine, pin elevating mechanism for raising bowling pins from the pit of a bowling alley, a pin orienting device, a pin spotter, a plurality of pin spotting units mounted on said spotter, a distributor having a pin receiving portion located adjacent said device for receiving pins butt end forward from said mechanism and a discharge portion remote from said pin receiving portion for delivering pins one by one to said units, and means for moving said distributor from one unit to another in a closed and generally triangular path of travel to effect the delivery of a single pin into each of said units.

4. In a bowling pin spotting machine, a pin elevating mechanism for raising bowling pins from the pit of a bowling alley, a pin orienting device, a frame, a plurality of pin holding units mounted on said frame, a distributor positioned above said frame having a pin receiving portion located adjacent said device for receiving pins butt end forward from said device and a discharge portion remote from said pin receiving portion for delivering

pins one by one to said units, means for moving said distributor across said machine from one unit to another to effect the delivery of a single pin from a succession of axially aligned pins into each of said units, a device adjacent each of said units for holding said distributor in position to deliver a pin into each empty unit, and means operative in response to the movement of a pin passing through said distributor for actuating said device to release said distributor for movement from a filled unit to an empty unit.

5. In a bowling pin spotting machine, a pin elevating device for raising pins from the pit of a bowling alley, a frame, a plurality of substantially triangularly arranged pin holding units carried by said frame, an endless distributing conveyor extending between said device and said frame, means for delivering pins from said device onto said conveyor for movement thereby in axial alignment, and means for moving said distributor in a generally horizontal plane above said frame from unit to unit to deliver pins one by one into empty pin holding units.

6. In a bowling pin spotting machine, pin elevating mechanism for raising pins from the pit of a bowling alley, a pin spotter, a plurality of substantially triangularly arranged pin spotter units carried by said spotter, an endless distributing conveyor located above said spotter, a pin orienting device for delivering pins discharged from said mechanism butt end forward onto said distributing conveyor for movement by said conveyor in axial alignment and delivery to said units, and means for moving said distributing conveyor transversely across the top of said spotter from spotter unit to spotter unit to deliver said pins one by one butt end foremost into empty spotter units.

7. In a bowling pin spotting machine, a pin conveyor, a pin spotter, a plurality of pin spotting units mounted on said spotter and arranged substantially in pin playing position thereon, a distributor, said distributor including an elongated distributing conveyor having a pin receiving portion located adjacent said pin conveyor and a discharge portion positioned adjacent said spotter, an extensible frame supporting said elongated distributing conveyor, a shaft mounting one end of said frame adjacent said pin receiving portion of said distributing conveyor, and mechanism for moving said frame from unit to unit and simultaneously therewith to extend or retract said frame and distributing conveyor to locate said discharge portion of said distributing conveyor adjacent empty spotting units on said spotter for discharge of pins thereinto.

8. In a bowling pin spotting machine, a pin conveyor, a pin spotter, a plurality of pin spotting units mounted on said spotter and arranged substantially in pin playing position thereon, a distributor, said distributor including an elongated distributing conveyor having a pin receiving portion located adjacent said pin conveyor and a discharge portion positioned adjacent said spotter, an extensible frame supporting said elongated distributing conveyor, a shaft mounting one end of said frame adjacent said pin receiving portion of said distributing conveyor, a track on said spotter, a distributor moving device carried by said frame and engaging said track, and means operative in response to the movement of a pin to an empty unit for actuating said device to cause said device to move along said track and extend or retract said frame, whereby to locate said discharge portion adjacent an empty spotting unit.

9. In a bowling pin spotting machine, a pin elevating device for raising bowling pins from the pit of a bowling alley, a pin spotter, a plurality of pin spotting units mounted on said spotter in an arrangement corresponding to the playing arrangement of bowling pins on the playing bed of a bowling alley, a distributor conveyor having a pin receiving portion adapted to receive pins from said device and a discharge portion for delivering pins to said units, means for moving said conveyor from one unit to another in a closed path of travel to effect the delivery

of single pins to said units, and means for selectively extending and retracting said conveyor during its movement to locate said discharge portion in position to deliver pins into each unit in said arrangement.

10. In a bowling pin spotting machine, a pin elevating device for raising pins from the pit of a bowling alley, a pin spotter, mechanism for moving said spotter to and from the playing bed of a bowling alley to spot and respot bowling pins thereon, a plurality of substantially triangularly arranged pin spotter units carried by said spotter, an elongated distributing conveyor extending between said device and said spotter, a support mounting said distributing conveyor for conjoint horizontal and vertical movement, and means for moving said distributing conveyor transversely of said machine across the top of said spotter to deliver pins one by one into empty spotter units during the movement of said spotter to and from said playing bed of said alley.

11. In a bowling pin spotting machine, a bowling pin distributing mechanism for delivering pins one by one to a frame provided with a plurality of spaced pin supporting units, means mounting said frame for movement to and from the playing bed of a bowling alley, said mechanism including a support, an elongated generally U-shaped channel, an endless conveying belt having a pin conveying lap running along the bottom of said channel, swivel means mounting said channel on said support for combined lateral and vertical movement, means for driving said belt to convey said pins to said units and means for moving said channel laterally and vertically during the delivery of said pins to said units.

12. In a bowling pin spotting machine, bowling pin conveying and distributing mechanism, a frame, a plurality of substantially triangularly arranged pin spotting units mounted on said frame, said mechanism comprising a support, a pin distributing channel pivotally attached at one end to said support, said channel including two telescopically associated generally U-shaped guide chutes, a front support member for said channel, a driving device mounted on said front support, a guide track for said front support member on said frame, means for operating said driving device to move said front support member along said track and travel said channel back and forth relative to said frame, the shape of said guide track being such as to simultaneously therewith effect an extension and retraction of said guide chutes, and means for moving said frame to and from a bowling alley during the operation of said distributing mechanism.

13. The invention defined in claim 6 including a stop mounted adjacent each of said units, a device on said distributing conveyor adapted to engage a stop adjacent an empty unit and arrest the transverse movement of said conveyor, and pin actuated means for releasing said device from said stop for movement of said distributor into engagement with the stop adjacent an empty unit.

14. The invention defined in claim 13 including a counting mechanism, a trip in said mechanism, means mounting said trip for engagement by pins moved by said distributing conveyor to said units, and means operative in response to the delivery of a pin to each of said units for preventing the feed of additional pins by said distributing conveyor.

15. In a bowling pin spotting machine, a pin conveyor, a pin handling frame including a plurality of spaced pin holding units, an elongated pin distributor adapted to receive pins from said conveyor and convey said pins one by one to said units, a vertical pivot for the end of said distributor adjacent said conveyor, a swivel block at the front end of said distributor, a track on said frame, driven means on said block engaging said track, driving means for operating said driven means, and means for operating said driving means to drive said driven means along said track and swing said distributor about said vertical pivot from unit to unit for delivery of said pins by said distributor to said units.

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16. The invention defined in claim 15 wherein said track is provided with spaced teeth, and said driven means engaging said track moves said distributor laterally and along said track, and means for holding said front end of said distributor in operative position on said track.

17. In a bowling pin spotting machine, a pin elevating device for raising bowling pins from the pit of a bowling alley, a pin handling frame, a plurality of spaced pin holding units mounted on said frame, a track having a portion adjacent each of said units mounted on said frame; an extensible and laterally movable distributor having a pin receiving portion for receiving pins from said device and a pin discharge portion delivering them to said units, a pivotal mount for one end of said distributor, a device at the free end of said distributor connecting said distributor for movement along said track from unit to unit in delivering pins to said units, and means for driving said device to move said distributor laterally and locate said pin discharge portion thereof adjacent each of said units.

18. The invention defined in claim 17 including stops mounted on said track adjacent each unit, an element on said discharge portion of said distributor adapted to engage each of said stops as said distributor is moved from unit to unit, and trip means operative in response to the movement of each pin to an empty unit for moving said element out of engagement with the stop adjacent said unit to permit said distributor to move to an empty unit.

19. The invention defined in claim 18 wherein said trip means includes a trip arm extending into said distributor, a pivoted plate mounting said element engaging said stops, and connections between said trip arm and pivoted plate whereby a pin in said distributor moving past said arm lifts said plate and releases said element from engagement with said stop.

20. The invention defined in claim 19 including mechanism for moving said frame to and from said bowling alley, supports maintaining said frame substantially parallel with said alley both when stationary and moving, and means for maintaining said swivel block substantially parallel with said frame.

21. The invention defined in claim 20 wherein said last named means includes a parallelogram structure including parallel interconnected arms and means connecting two of said parallel arms to said swivel block.

22. The invention defined in claim 15 wherein said track is provided with spaced teeth, and a shaft in said swivel block mounting said driven means engaged in said track, said driven means being provided with teeth coacting with said teeth on said track.

23. The invention defined in claim 22 including a device coacting with said driven means engaging said track for maintaining said driven means continuously in engagement with said track.

24. The invention defined in claim 22 including a pair of spaced parallel rods, each rod having one end pivotally connected to said swivel block, a second pair of parallel rods connected at one end to said machine, and a bell crank lever pivotally connected to the other ends of each of said rods of said pairs of rods, thereby forming a parallelogram structure maintaining said shaft of said driven member substantially at right angles to the plane of said pin handling frame.

25. Bowling pin handling apparatus for a bowling pin spotting machine comprising a frame, a pin receiving and pin orienting device mounted on said frame, said device having downwardly and inwardly inclined pin receiving and guiding sides, projecting abutment means on at least one of said sides adapted to be engaged by the handle end of pins delivered to said device, and an endless conveyor supported on said frame and having a pin supporting and conveying lap running between said sides to a point of discharge remote therefrom.

26. The invention defined in claim 25 including a movable generally U-shaped chute having a bottom sur-

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face over which said pin supporting and conveying lap travels, and spaced upstanding guide sides, and mechanism for moving said chute inwardly and outwardly in the direction of the path of travel of said lap of said conveyor, including means for simultaneously increasing and decreasing the active length of said conveyor pin supporting and conveying lap in conformity with the extended or retracted position of said movable chute.

27. The invention defined in claim 26 including a support mounting said chute for conjoint lateral and vertical movement, and means operative in response to a pin being advanced by said conveyor for delivery from said chute for effecting the movement of said chute from one pin receiving station to another.

28. The mechanism defined in claim 9 including means for delivering pins from said device to said distributor conveyor, and means for operating said elevating device and said distributor conveyor at uniform speeds having a predetermined relation to each other such that pins delivered to said distributor conveyor by said delivering means are substantially equally spaced therealong.

29. In a bowling pin spotting machine, pin elevating mechanism for raising bowling pins from the pit of a bowling alley, a pin orienting device, a frame, a plurality of pin holding units mounted on said frame, a distributor mounted above said frame having a pin receiving portion located adjacent said device for receiving pins butt end forward from said device and a discharge portion remote from said pin receiving portion, said distributor having conveying means for moving pins in axial alignment from said receiving portion to said discharge portion for delivering pins one by one to said units, means for moving said distributor across said machine from one unit to another to effect the delivery of a single pin into each of said units, and pin actuated means associated with said distributor for controlling the movement of said distributor in response to the movement of each of said pins by said conveying means for discharge from said discharge portion into one of said units.

30. In a bowling pin spotting machine, a pin elevating device for raising bowling pins from the pit of a bowling alley, a pin spotter, a plurality of pin spotting units in substantially triangular arrangement mounted on said spotter, an endless distributor conveyor having a pin receiving portion adapted to receive pins from said device and a discharge portion for delivering pins to said units, and means for moving said discharge portion of said conveyor transversely and longitudinally relative to said spotter from one unit to another of said substantially triangularly arranged units to effect the delivery of single pins in succession into said units.

31. In a bowling pin spotting machine, a pin conveyor, a pin spotter, a plurality of pin spotting units mounted on said spotter and arranged substantially in pin playing position thereon, a distributor, said distributor including an elongated distributing conveyor having a pin receiving portion located adjacent said pin conveyor and a discharge portion positioned above and adjacent said spotter, a frame supporting said elongated distributing conveyor, a shaft mounting one end of said frame adjacent said pin receiving portion of said distributing conveyor, and means for moving said frame and positioning said discharge portion of said distributing conveyor successively adjacent empty spotting units on said spotter for discharge of pins thereto.

32. In a bowling pin spotting machine, a pin supporting member having spaced substantially triangularly arranged pin supporting units, a bowling pin distributing mechanism for delivering bowling pins to said units, comprising a support, an elongated generally U-shaped channel pivotally mounted on said support, an endless pin-conveying belt located in said channel and running along said channel, means for driving said belt to convey pins one after the other to said member, and means for moving said channel back and forth across said machine and locating the discharge end of said pin-conveying belt ad-

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jacent one unit after another to deliver a bowling pin to each of said spaced units.

33. The mechanism defined in claim 32 wherein said channel includes two interconnected U-shaped chute guides, and means for automatically effecting relative longitudinal movement between said guides to decrease or increase the length of said U-shaped channel and said conveyor belt moving therealong in accordance with the position of each of said substantially triangularly arranged units to which a pin is delivered.

34. The invention defined in claim 32 wherein said channel moving means includes a guide element on said supporting member for one end of said channel, a displacing unit connecting said one end of said channel with said element, a stop adjacent each unit for interrupting the lateral travel of said channel, and pin actuated means for releasing said channel for movement to an empty unit

35. The invention defined in claim 32, wherein said U-shaped channel includes telescopically mounted U-shaped chute pin guides, supports mounting said guides for relative extension and retraction, and wherein said means for moving said channel comprises a guide track and driving and driven devices on the pin delivery end of said channel engaging and running on said track.

36. In a bowling pin spotting machine, a pin elevating device for raising bowling pins from the pit of a bowling alley, a pin handling frame, a plurality of spaced pin holding units mounted on said frame, a track having a portion adjacent each of said units mounted on said frame, an extensible and laterally movable distributor having a pin receiving portion for receiving pins from said device and a pin discharge portion delivering them to said units, a pivotal mount for one end of said distributor, a device at the free end of said distributor connecting said distributor for movement along said track from unit to unit in delivering pins to said units, means for driving said device to move said distributor laterally and locate said pin discharge portion thereof adjacent each of said units, stops mounted on said track adjacent each of said units, an element on said discharge portion of said distributor adapted to engage each of said stops as said distributor is moved from unit to unit, trip means operative in response to the movement of each pin to an empty unit for moving said element out of engagement with the stop adjacent said unit to permit said distributor to move to an empty unit, and actuating means operative in response to the release of said element from a stop adjacent a pin filled unit for actuating said means for driving said device to move said discharge portion of said distributor to an empty unit and position said element against a stop adjacent said empty unit, the engagement of said element with said stop being operative to incapacitate said actuating means.

37. In a bowling pin spotting machine, a pin supporting member having spaced substantially triangularly arranged pin supporting units, a bowling pin distributing mechanism for delivering bowling pins to said units, comprising a support, an elongated generally U-shaped channel pivotally mounted on said support, said channel comprising telescopically mounted generally U-shaped pin guides, supports mounting one of said guides for extension and retraction relative to the other of said guides, pin conveying means located in said channel, mechanism for driving said pin conveying means to convey pins one after the other, means for moving said channel back and forth across said machine and locating the discharge end thereof adjacent one unit after another to deliver a bowling pin to each of said spaced units, said last-named means including a guide track constraining the pin discharge end of said channel to travel along a closed irregular path, a driven member engaging said track, a continuously driven drive shaft, gearing connecting said drive shaft to said driven member, a constant torque clutch associated with said shaft for driving said gearing

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and member to move said channel, means for stopping the movement of said driven member prior to the delivery of a pin into one of said units, and pin actuated means for restarting the operation of said member to travel said discharge end of said channel along said track to an empty unit.

38. Pin handling apparatus for a bowling pin spotting machine comprising a frame, a pin receiving and orienting member, means delivering pins to said member, a pin guide mounted on said frame and adapted to receive pins from said member, a second pin guide having a pin discharge portion mounted on said frame, a carriage mounting said second pin guide for telescopic movement relative to said first-named pin guide, and means for moving said frame laterally and for imparting reciprocatory movement to said carriage to locate said discharge portion of said second pin guide adjacent a plurality of pin receiving stations.

39. The apparatus defined in claim 38 wherein said frame includes a pair of spaced substantially parallel elongated rods, rollers on said carriage running on said pair of rods, a second pair of spaced substantially parallel rods mounted in said carriage and projecting outwardly therefrom, and means attaching said discharge portion of said second pin guide to said projecting ends of said second pair of rods.

40. The apparatus defined in claim 39 including a bracket supporting said first-named pin guide and a pulley, a pulley floatingly mounted on said carriage, a bracket attached to the projecting ends of said second pair of rods, a pulley mounted on said bracket, a bracket connecting the ends of said first-named pair of rods, a pulley supported on said last-named bracket, and an endless belt running upon said pulleys and having a lap running upon said pin guides, said floatingly mounted pulley acting to provide constant tension and compensate for stretch in said endless belt.

41. In a bowling pin spotting machine, pin elevating mechanism for raising bowling pins from the pit of a bowling alley, a pin orienting device positioned to receive pins from said elevating mechanism, a frame mounted above said alley at a position substantially displaced longitudinally of the alley from said orienting device, a plurality of pin holding units mounted on said frame, a pin distributor including positively driven pin advancing means mounted for swinging movement from side to side of said alley, said distributor having its pin receiving end disposed adjacent the outlet end of said pin orienting device and its discharge end in pin discharging relation to said units, and means for moving said distributor to travel the discharge end thereof from one unit to another to effect the delivery of a single pin advanced by said pin advancing means into each of said units.

42. In a bowling pin spotting machine, a pin conveyor, a pin spotter, a plurality of pin spotting units mounted on said spotter and arranged substantially in pin playing position thereon, an elongated distributor, said distributor having a pin receiving portion located adjacent said pin conveyor and a discharge portion for discharging pins for delivery to said spotter, a frame supporting said distributor, a movable mount for said frame, mechanism for moving said mount to travel said distributor transversely relative to the path of travel of pins in said distributor and in a generally horizontal plane to a plurality of points of discharge of pins to be delivered to said units, said mechanism including means for locating said discharge portion of said distributor in position to deliver bowling pins serially at each of said points of discharge, said mechanism and said last-named means including a track on said spotter, a driven member on said frame engaging said track, driving means for said driven member, a pin actuated trip, and means operative in response to the actuation of said trip in response to the engagement of a pin therewith to connect said driving means and

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said driven member for selectively driving said driven member along said track to locate said discharged portion at said points of discharge.

43. In a bowling pin spotting machine, mechanism for elevating pins from the pit of a bowling alley to a pin delivery station, a frame mounted above said alley at a position substantially displaced longitudinally of the alley from said pin delivery station, a plurality of pin supports on said frame, an elongated pin distributor including positively driven pin advancing means, means mounting said distributor for swinging movement from one side to the other side of said alley, said distributor having its pin receiving end disposed adjacent said pin delivery station and its pin discharge end in pin discharging relation to said supports, means for moving said distributor to locate the discharge end thereof at spaced discharge stations for effecting the discharge of pins advanced by said advancing means at said stations for delivery to each of said supports.

44. In a bowling pin spotting machine, mechanism for removing pins from the pit of a bowling alley to a pin delivery station, a plurality of spaced discharge stations above said alley and at a position substantially displaced longitudinally of the alley from said pin delivery station, an elongated pin distributor having a pin receiving end adjacent said delivery station and a pin discharge end in pin discharging relation to said discharge stations, said distributor including pin advancing means, and means for driving said pin advancing means, means mounting said distributor for movement from side to side of said alley, and means for moving said distributor to locate the discharge end thereof at one discharge station after another and effecting the delivery of pins in succession by said advancing means from said distributor.

45. Pin handling and distributing mechanism for a bowling pin spotting machine comprising a distributing conveyor, a pin elevating device for removing pins from a bowling alley and delivering them to a delivery station, a member at said station having downwardly and inwardly inclined portions for receiving pins delivered from said elevating device and for directing pins received thereby to said conveyor, pin orienting guide means on at least one of said downwardly and inwardly inclined portions of said member, said guide means forming an abutment against which the handle end of a pin delivered to said member by said device may engage while the butt end thereof moves downwardly onto said conveyor, and means for driving said conveyor to move said pin butt end forwardly to a point of discharge.

46. In a bowling pin spotting machine, mechanism for conveying bowling pins from the pit of a bowling alley to a pin delivery station, a pin receiving device having a plurality of spaced pin discharge stations, means mounting said device at a position substantially displaced longitudinally of the alley from said pin delivery station, an elongated pin distributor having a pin receiving end adjacent said pin delivery station and a pin discharge end in pin discharging relation to said spaced pin discharge stations, said distributor including pin advancing means, and means for driving said pin advancing means, means mounting said distributor for movement from side to side of said alley, means for moving said distributor to travel the discharge end thereof from one discharge station to another and effecting the discharge of a pin from said distributor by said advancing means at each of said discharge stations, said means for moving said distributor including pin actuated trip means, and mechanism operative in response to the engagement with said trip means of a pin advanced by said advancing means for discharge from said discharge end of said distributor to cause the discharge end of said distributor to be moved to an adjacent discharge station.

47. A bowling pin handling apparatus comprising an elongated frame, a pin receiving and orienting device at one end of said frame adapted to align pins for delivery

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therefrom butt end forward, an endless conveyor mounted on said frame for receiving and conveying a succession of axially aligned pins butt end forward from said device to a discharge portion of said conveyor, means mounting said frame for lateral movement of said conveyor to and from a point of discharge at spaced pin discharge stations, means for driving said conveyor, and means responsive to the movement of a pin by said conveyor for effecting the movement of said frame from one station to another, said device including a member of generally U-shaped outline having arms extending downwardly towards said conveyor, and an orienting guide on at least one of said arms forming an abutment against which a pin may move while the butt end thereof drops onto said conveyor for butt end forward travel of said pin on said conveyor to said discharge portion.

48. A bowling pin handling apparatus for use in a bowling pin spotting machine comprising an elongated frame, a pin receiving and orienting device at one end of said frame adapted to align pins for delivery therefrom butt end forward, an endless conveyor mounted on said frame for receiving and conveying a succession of axially aligned pins butt end forward from said device, means mounting said frame for movement of said conveyor to and from a point of discharge at spaced discharge stations, means for driving said conveyor, means responsive to the movement of a pin by said conveyor for effecting the movement of said frame from one discharge station to another, said frame including a fixed generally U-shaped pin guide chute and a generally U-shaped movable chute along which a portion of said conveyor runs, means on said frame mounting said movable chute for telescopic coaction relative to said fixed chute, and means for extending and retracting said movable chute relative to said fixed chute to locate the open end of said movable chute adjacent said discharge stations for discharge of pins by said conveyor from said open end of said movable chute.

49. A bowling pin handling apparatus comprising an elongated frame, a pin receiving and orienting device at one end of said frame adapted to align pins for delivery therefrom butt end forward, an endless conveyor mounted on said frame for receiving and conveying a succession of axially aligned pins butt end forward from said device, means mounting said frame for lateral movement of said conveyor to and from a point of discharge at spaced pin discharge stations, means for driving said conveyor, and means responsive to the movement of a pin by said conveyor for effecting the movement of said frame from one station to another, said apparatus including a generally U-shaped pin guide chute and a generally U-shaped movable chute along which a portion of said conveyor runs, means on said frame mounting said movable chute, and means for extending and retracting said movable chute relative to said U-shaped pin guide chute to locate the open end of said movable chute adjacent a plurality of pin discharge stations for discharge of pins by said conveyor from said open end of said movable chute, said means for effecting the movement of said frame comprising a clutch, driving means and driven means adapted to be coupled by said clutch and resilient means coacting with said clutch to maintain the driving force of said clutch substantially constant regardless of the direction of movement and position of said U-shaped movable chute.

50. Bowling pin handling and orienting apparatus for a bowling pin spotting machine comprising a frame, a pin receiving and orienting device mounted on said frame, said device having downwardly and inwardly inclined pin receiving and guiding sides, endless conveying means having a pin receiving portion mounted adjacent the bottom of said downwardly inclined sides of said device to receive and convey pins to a point of discharge remote therefrom, means for driving said conveying means, and means on said device positioned for engagement by the

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handle end of a pin delivered to said device for preventing substantial further forward movement of said handle end of a pin on said device while the butt end of said pin moves downwardly onto said conveying means for orienting such pin for butt end delivery by said device 5 onto said conveying means.

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