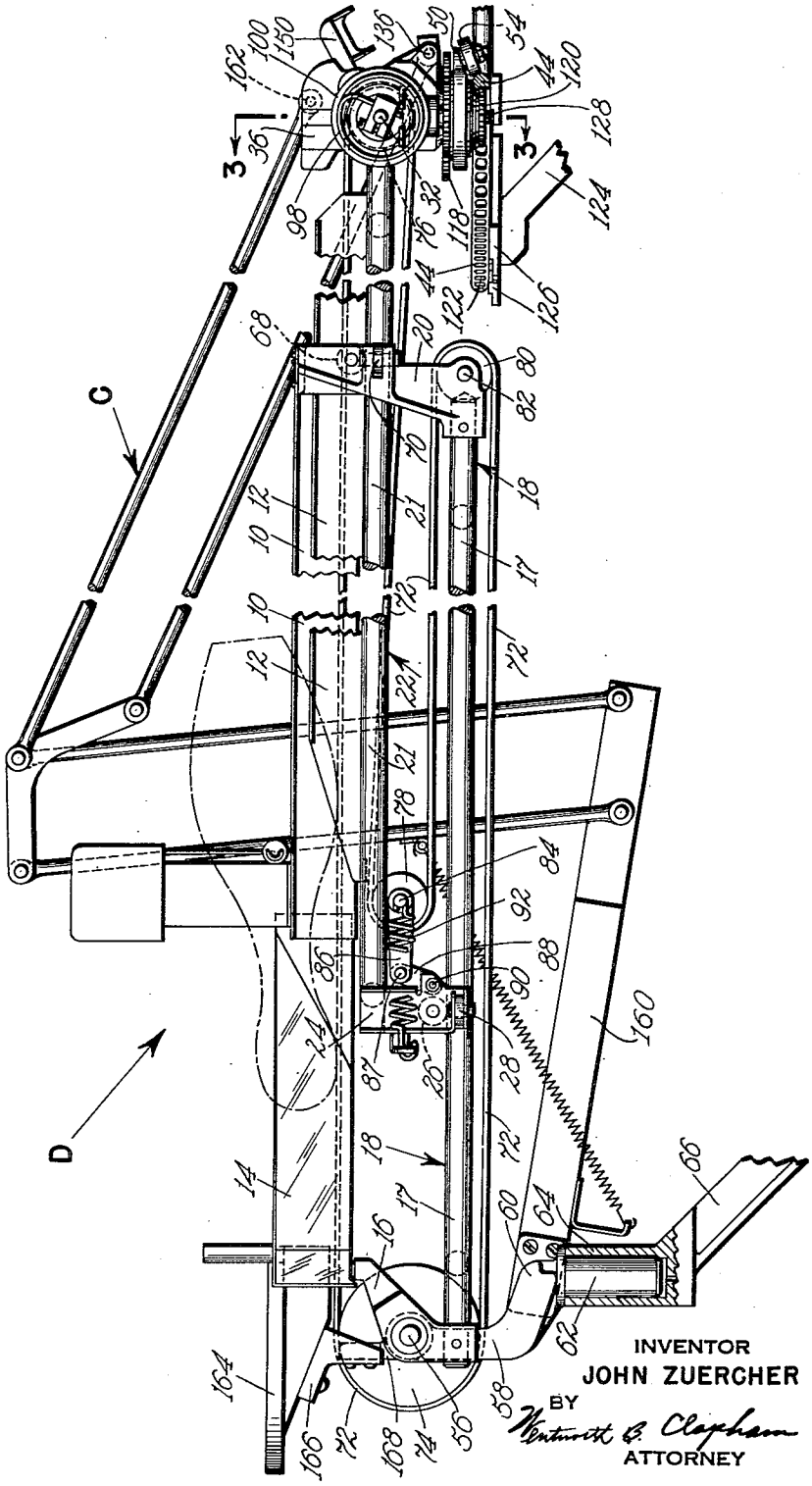
Nov. 6, 1956 J. ZUERCHER 2,769,637

DISTRIBUTOR MECHANISM FOR BOWLING PIN SPOTTING MACHINES

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FIG. 1



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DISTRIBUTOR MECHANISM FOR BOWLING PIN SPOTTING MACHINES

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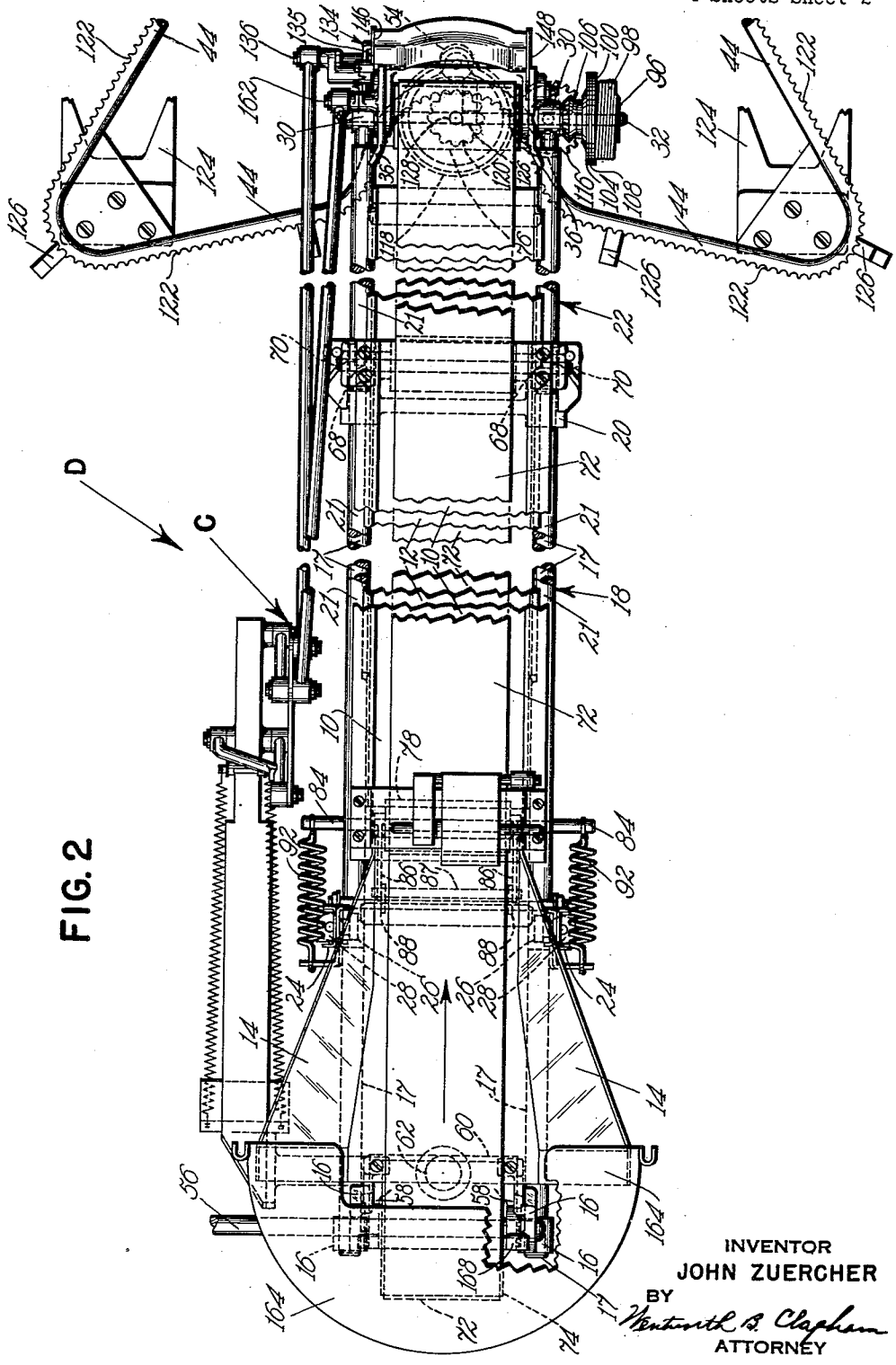


FIG. 2

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DISTRIBUTOR MECHANISM FOR BOWLING PIN SPOTTING MACHINES

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FIG. 3

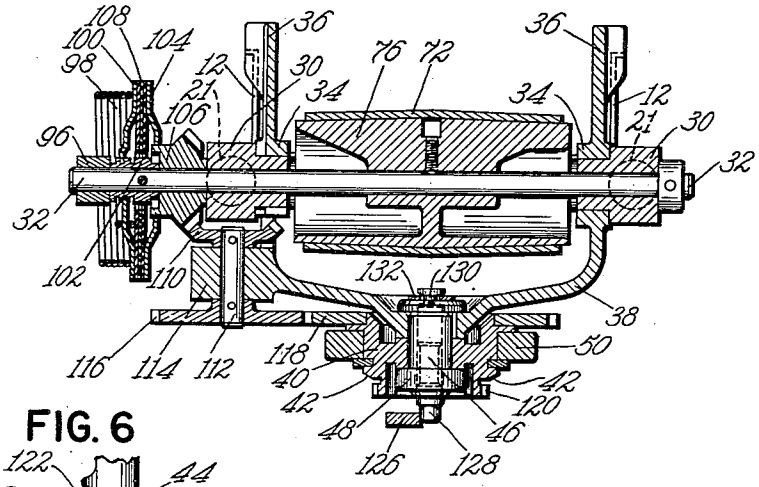


FIG. 6

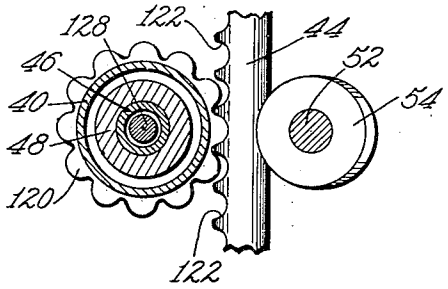


FIG. 5

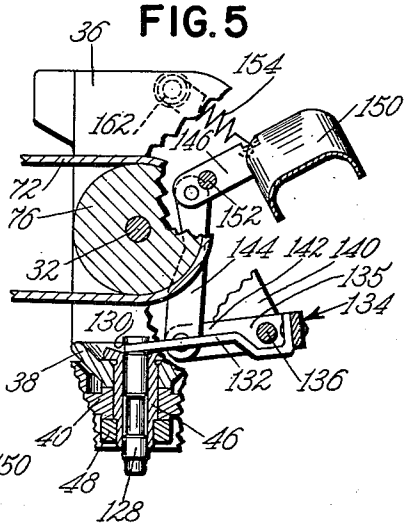
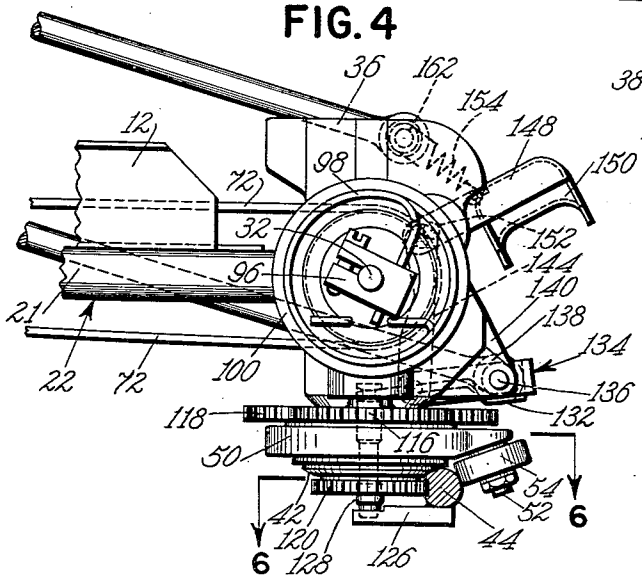


FIG. 4



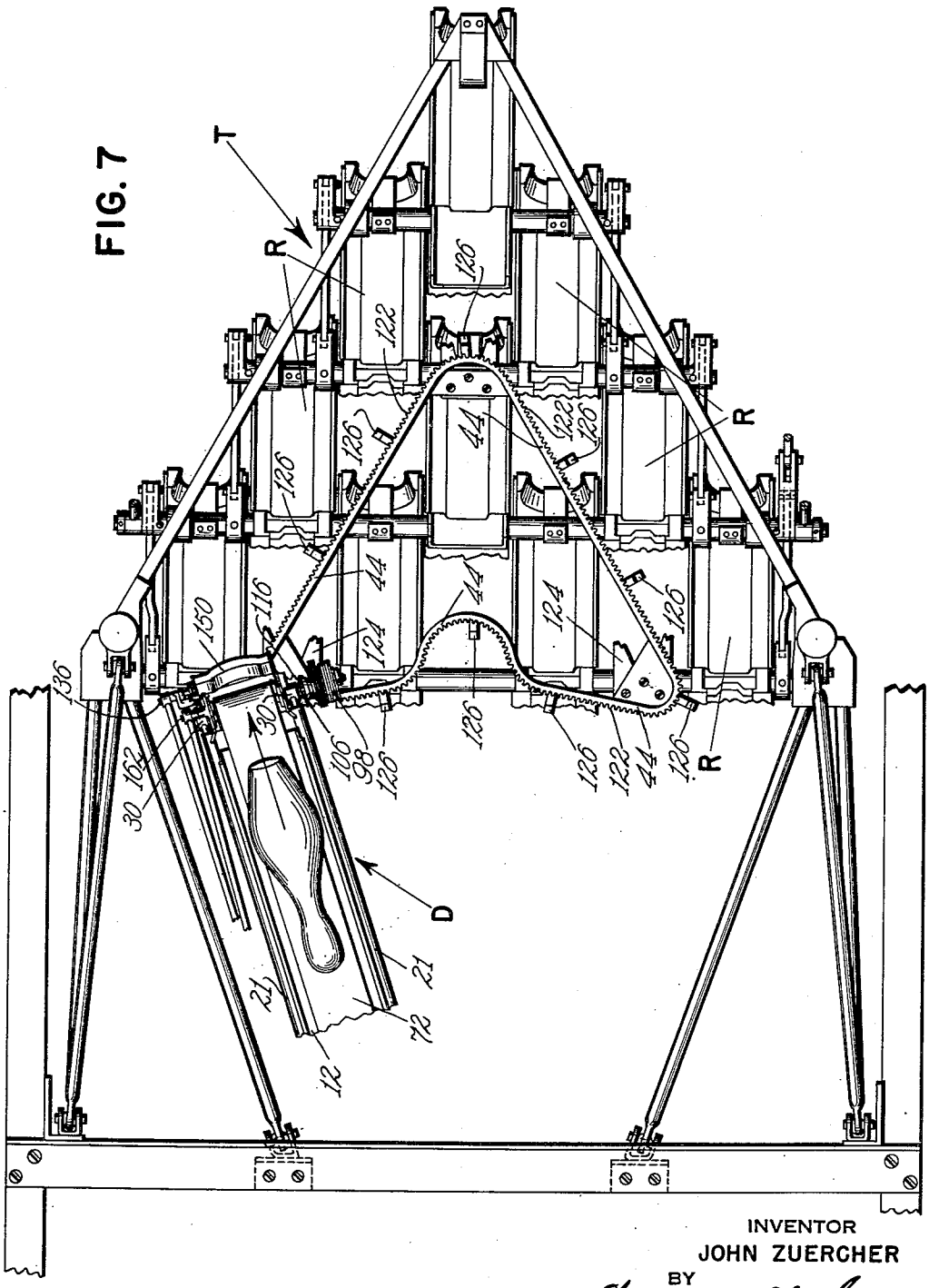
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FIG. 7



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2,769,637

DISTRIBUTOR MECHANISM FOR BOWLING PIN SPOTTING MACHINES

John Zuercher, Buffalo, N. Y., assignor to American Machine & Foundry Company, a corporation of New Jersey

Application April 5, 1952, Serial No. 280,697

6 Claims. (Cl. 273—43)

The invention relates to bowling pin spotting machines, and more particularly to improvements in mechanism for delivering bowling pins rapidly and in succession to the pin spotting device of a bowling pin spotting machine.

The invention relates primarily to improvements in the pin handling mechanism disclosed in my copending application, Serial Number 178,777, filed August 11, 1950, for Pin Handling Mechanism for Bowling Pin Spotting Machines.

The invention consists in improved means and mechanism for controlling the movement of the distributor along the guide track on the pin spotter table such that the distributor can move from a filled pin spotting receptacle to an empty one, only after a pin has actually been delivered to a receptacle and the latter is filled. This eliminates danger of pins being thrown onto the pin spotter table or jams occurring because of improper delivery.

The invention also consists in a simplification of the mechanism disclosed in the above referred to copending application in that the track along which the distributor driving means moves is provided with rounded teeth conforming generally with the profile of a sprocket chain. These teeth are engaged by a gear forming a part of the driving means provided with rounded teeth which cooperate with the teeth on the track to provide a smooth drive at all time regardless of the position of the gear on the track.

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:

Fig. 1 is a side elevation of an improved pin distributor mechanism for bowling pin spotting machines embodying the invention;

Fig. 2 is a plan view of the same;

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

Fig. 4 is a side elevation of the delivery end of the distributor;

Fig. 5 is a partial sectional end elevation of the delivery end illustrating the index locking mechanism of the same;

Fig. 6 is a detailed sectional plan view taken on line 6—6 of Fig. 4 illustrating the driving and supporting mechanism of the delivery end on an enlarged scale; and

Fig. 7 is a partial plan view of the pin distributor in conjunction with the pin setter table of an automatic bowling machine, illustrating the track which controls the path of travel of the distributor in delivering pins to spotting units on the table.

The improved pin distributor D, shown in the accompanying drawings, consists of a pair of U-shaped pin guide chutes 10 and 12 (Figs. 1 and 2) 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 or pin receptacles R of the pin setter table is receiving a pin from distributor D.

Chute 10 at its pin receiving end is provided with a flared and funnel-shaped pin receiving end or extension 14 rigidly joined thereto, as by welding, and with chute 12 forms one continuous chute or pin guideway. At its pin receiving end, chute 10 is secured to a pair of spaced brackets 16 attached beneath pan 164, referred to hereinafter, to ends of a pair of spaced rods 17 of a suitable frame 18. Secured to the other ends of rods 17 of frame 18 is a bridge bracket 20, to the upper end of which is mounted the extreme forward end of chute 10.

Chute 12 is secured to and carried by spaced horizontal rods 21 of a suitable frame 22 which on one end is provided with a pair of spaced vertical lugs 24 to each of which is pivoted a roller 26. Each roller 26 rolls on the top edge of the respective rod 17 of frame 18 which is located exactly in line beneath frame 22 so that the latter at this end is supported by and slidingly engages with frame 18. To maintain frames 18 and 22 in vertical alignment and to prevent any side sway as the distributor is moved laterally and chute 12 is extended and retracted relative to chute 10, each vertical lug 24 of frame 22 carries a roller 28 which contacts the outer or lateral edge of each respective rod 17 of frame 18.

The extreme forward ends of the rods 21 of frame 22, as viewed at the right in Figs. 1, 2 and 3, are secured to a pair of spaced bearing lugs 30 (Figs. 2 and 3) loosely mounted on a horizontal shaft 32. Each bearing lug 30 is pivotally supported in a bearing hub 34 (Fig. 3) one of which is provided on each of the two spaced uprights 36 of a U-shaped distributor head bracket 38. The lower central portion of bracket 38 is supported by the hub of a barrel member 40. This member is provided with a bevel surface 42, which rests on the upper rounded edge of the distributor track 44 mounted on pin setter table T.

Bracket 38 and barrel member 40 are connected by means of a sleeve shaft 46 keyed to bracket 38. Barrel member 40 is free to rotate about sleeve shaft 46. A collar 48 attached to sleeve shaft 46 in any suitable manner prevents vertical movement of barrel member 40 on sleeve shaft 46. Pivotally attached to the outer periphery of barrel member 40 is a swivel member 50 which by means of stud 52 pivotally mounted thereon (Fig. 4), carries an angularly positioned thrust and guide roller 54 which, together with the bevel surface 42 of barrel member 40, supports and guides the entire front end of pin distributor D on track 44. The other end of distributor D or more particularly pin receiving end 14 of the guide chute 10 is, as mentioned heretofore, supported by the pair of spaced brackets 16 pivotally held by a horizontal shaft 56 (Fig. 1) rotatably supported by a pair of spaced upright arms 58 of a U-shaped bracket 60 which at its lower end is provided with a vertical stud 62 rotatably supported in a suitable vertical bearing 64 of a bearing bracket 66 secured to the frame (not shown) of the pin setting machine.

Bridge bracket 20 to which the front end of guide chute 10 is attached is also provided with two pairs of rollers 68 and 70 (Fig. 1). Rollers 70 roll upon the outer lateral edges of rods 21 of frame 22 and assist in retaining its vertical alignment with frame 18. Rollers 68 roll upon the upper edges of rods 21 of frame 22 and

thus provide a roller support from which is suspended bracket 20 to which one end of frame 18 is attached.

Pin distributor D is also provided with an endless pin conveyor, such as belt 72, which is driven continuously by pulley 74. Conveyor belt 72 is led over the bottom of the substantially U-shaped channel formed by guide chutes 10 and 12, and end extension 14 onto a pulley 76 mounted on horizontal shaft 32 supported in the bearing lugs 30 and distributor head bracket 38. From pulley 76, conveyor belt 72 is led over tension roller 78 and a guide roller 80 mounted on shaft 82 supported by bridge bracket 20. Tension roller 78 is loosely mounted on a shaft 84 (Fig. 1) supported in the free ends of a pair of spaced links 86 pivotally connected at their other ends by means of horizontal shaft or rod 87 to a pair of spaced arms 88 formed on and extending upwardly from a rod or shaft 90 supported at each end in suitable bearing lugs integral with vertical lugs 24. Attached to each vertical lug 24 is one end of a tension spring 92, the other end of which is secured to one end of floating shaft 84. This arrangement provides constant resilient tension to pin conveyor belt 72.

Pin conveyor belt 72 conveys pins from a source of supply, such as a conveyor (not shown) which removes them from the pit of a bowling alley (not shown), to pin spotting receptacles R carried by table T. It also provides driving means for moving the front or delivery end of the pin distributor along the heart-shaped track 44, during which time distributor D is elongated or shortened in order to accommodate it to the several positions of spotting receptacles R. Since conveyor belt 72 is driven continuously, the latter through pulley 76, imparts continuous rotary motion to shaft 32 (Fig. 3).

Adjustably clamped to one end of shaft 32 is a collar 96 to which is anchored one end of a torsion spring 98. The other end of spring 98 is attached to clutch disc 100 which loosely engages with a spiral external thread of a hub or sleeve 102 secured to shaft 32. Another clutch disc 104 is integral with the hub of a bevel gear 106 loosely mounted on shaft 32.

The rotary motion of the shaft 32 through collar 96 and torsion spring 98, is imparted to clutch discs 100 and 104 which rotate bevel gear 106. The tension of spring 98 is set to a desired amount sufficient to effect a firm engagement of clutch discs 100 and 104 with a conventional clutch lining disc 108 located between them (Fig. 3). Bevel gear 106 meshes with bevel gear 110 mounted on the upper end of vertical shaft 112 rotatably supported in a suitable bearing lug 114 projecting from distributor head bracket 38.

A gear 116, secured to the lower end of shaft 112, meshes with a gear 118 keyed to the upper end of the barrel member 40. The lower end of barrel member 40 carries a rounded tooth gear 120, preferably formed integrally therewith, which engages with corresponding teeth 122 formed in the lateral outer edge of the heart-shaped track 44, in any suitable manner, as by milling. Track 44 is supported at three points by means of suitable brackets 124 mounted on pin spotting table T. Teeth 122 conform generally with the profile of a sprocket and coact with the teeth of gear 120 to give a smooth drive which is highly desirable in insuring the most satisfactory results in the operation of distributor D.

Since distributor D delivers pins to each of the ten triangularly arranged pin spotting receptacles R on table T, the front end of distributor D following heart-shaped track 44 must be moved to and stopped at each pin spotting receptacle in succession until each pin spotting receptacle contains a pin. In order to effect the desired successive interruptions in the movement of distributor D at each of the ten receptacles, track 44 is provided with ten properly located and spaced stop lugs 126, welded or otherwise suitably attached to track 44.

As shown in Figure 4, stop lugs 126 are fixed to the under side of track 44 and project outwardly into the path of travel of a stop pin 128 carried by and projecting vertically downwardly from the center of sleeve shaft 46 on distributor head bracket 38. The upper end of stop pin 128, which is slidably mounted in stationary sleeve shaft 46, is formed with an annular groove 130 (Figs. 3, 4 and 5) into which loosely projects the forked end of an arm 132 secured to and projecting from the bottom member of a U-shaped lever 134. Side members 135 of lever 134 are pivotally supported by a horizontal rod 136 held at each end in a pair of suitable lugs 138 and 140 which are integral with and project from distributor head bracket 38.

One of the side members of U-shaped bracket 134 is provided with an extension 142 (Fig. 5) connected by link 144 to arm 146. Arm 146 together with a similar arm 148 (Fig. 2), support a suitably shaped index bridge 150 which is rigidly secured between both arms. Both arms 146 and 148 by means of a pair of studs 152 (Fig. 5), are pivotally attached to the distributor head bracket 38. A tension spring 154 anchored to bracket 38 and attached to arm 146, tends to maintain index bridge 150 in its uppermost position at all times.

Index bridge 150 is located adjacent the front or discharge end of pin conveyor belt 72 and in front of pulley 76 so that any pin forwarded by delivery belt 72 to a pin spotting receptacle R must pass over index bridge 150. When index bridge 150 is in its uppermost position, as shown in Figures 1, 4 and 5, the lower end of stop pin 128 is located in operative position or positioned to engage with one of the stop lugs 126 projecting from track 44. This arrests or stops the translatory movement of the front end of distributor D adjacent and in line with the pin receptacle R on table T adjacent such stop lug 126. A pin which is delivered to this particular receptacle, will upon leaving the conveyor belt 72, pass over index bridge 150 and then drop into this receptacle R. However, the weight of the pin passing over index bridge 150 will cause momentary downward movement thereof, and through the connected linkages and arms described above, cause the forked end of arm 132 to move upwardly and also lift stop pin 128 upwardly and out of engagement with stop lug 126 adjacent receptacle R to which this pin was delivered. It will be evident that distributor D must remain stationary as regards any empty pin setting receptacle adjacent which it is located until a pin has actually been discharged therefrom into the empty receptacle. This arrangement insures that each pin will be delivered properly into each empty receptacle before the distributor moves from a filled receptacle to the next receptacle to be filled.

Since pin conveyor belt 72 is driven continuously, and since, as described heretofore, it is the driving means for the front end of the distributor along track 44, clutch plates 100 and 104 have the tendency to transmit the drive to gear 120 at all times. However, when stop pin 128 engages with a stop lug 126, the front end of distributor D, and also gear 120 and all other gears 118, 116, 110 and 106, are stopped. Since clutch disc 104, which is attached to bevel gear 106, is also arrested, the friction between arrested clutch disc 104 and the still rotating clutch disc 100, tends to somewhat retard rotation of the latter which is only spring connected to the driving shaft 32. Due to the mounting of clutch disc 100 in the spiral thread or groove of sleeve 102, any retarding of the motion of disc 100 results in a lateral backing away motion which effects a slight separation of the two clutch discs and at the same time permits the clutch disc 100 to continue its rotation without ill effect on any of the mechanisms. As soon as stop pin 128 is lifted out of engagement with a stop lug 126, the gears are free to turn and clutch discs 100 and 104 re-engage with proper tension and the movement of the front end of distributor D along track 44 is resumed. As the same time, depending upon the location of the several pin spotting receptacles R, dis-

tributor D is extended or retracted in accordance with the position of its front end on track 44.

The especially rounded teeth of gear 120 contribute a great deal towards a smooth running of the distributor on track 44 and prevent said track from being scored or chewed up due to the sudden stops and advances of said distributor. The proper operation of the distributor on track 44 is also insured because of the manner in which the centers of gear 120 and roller 54 lie in the same straight line as they travel along track 44. The pin receiving end 14 of distributor D is pivotally, as well as swivelly connected, to a stationary bracket, while the front end is supported on table T, which is adapted to move to and from the bed of an alley (not shown) for spotting pins thereon. In order to keep the front end of distributor D and its mechanism always parallel with table T, regardless of its vertical position, a suitable parallelogram device C is provided. One end of parallelogram device C is pivotally attached to a suitable bar 160, projecting from and attached to bracket 60; its other end is pivotally connected to rod 136 and a stud 162 mounted in distributor head bracket 38.

The free ends of pin receiving and orienting pan 164 located at the receiving end of distributor D project over extension 14. This arrangement insures that pins delivered from the elevating conveyor (not shown) will be delivered properly into said conveyor 72. Pan 164 is mounted on a bracket 166 fixed to a pair of extension lugs 168, projecting upwardly from upright members 58 of U-shaped bracket 60. Since the latter can only swing in a horizontal plane, pin receiving pan 164 also remains in horizontal position.

The invention above described may be varied in construction within the scope of the claims, for the particular embodiments selected to illustrate the invention are but a few of the possible concrete forms which my invention may assume. The invention, therefore, is not to be restricted to the precise details of the structures shown and described.

What I claim is:

1. Pin distributing mechanism for a bowling pin spotting machine comprising a support, a pin spotter provided with a plurality of fixed pin receptacles, means mounting said support for movement in a horizontal plane, a pin receiving pan mounted on said support, an elongated generally U-shaped channel having one end thereof pivotally attached to said support beneath said pan for movement in substantially a vertical plane, an endless pin conveying belt located in said channel and running along said channel, means driving said belt to travel pins delivered onto said belt by said pan to a point of discharge at the free end of said channel into a selected pin receptacle, and means for locating said channel adjacent each receptacle into which a pin is to be discharged, a stop pin movably mounted on said free end of said channel, a stop adjacent each of said receptacles, said stops being mounted along the path of travel of said free end of said channel and in position to be engaged in succession by said stop pin to hold said free end of said channel stationary adjacent an empty receptacle for delivery of a bowling pin thereinto, trigger means mounted on the free end of said channel and connected to said stop pin, said trigger means being operative by a bowling pin in response to its discharge from the free end of said channel into an empty receptacle for moving said stop pin out of engagement with a stop and permitting said locating means to move said channel and locate said free end of said channel at the next empty receptacle to be filled.

2. In a bowling pin spotting machine, a pin spotter, a plurality of fixed pin spotting receptacles mounted on said spotter, a pin receiving device, a distributor having a pin receiving portion located adjacent said device for receiving pins from said device and a discharge portion having a delivery end remote from said pin receiving portion for delivering pins one by one to said receptacles, means mounting said distributor for bodily oscillatory movement in a substantially horizontal plane and also for movement in a vertical plane, a pin actuated trip device mounted on and adjacent said delivery end of said discharge portion positioned to be engaged by a bowling pin delivered from said discharge portion, a closed track on said spotter, means on said discharge portion of said distributor coupling said discharge portion to said track for movement therealong, a plurality of stops mounted on said track, each of said stops being located at a point of delivery of a pin to a receptacle, a movable latch on said delivery end of said discharge portion positioned to engage a selected stop and hold said distributor against movement, means connecting said latch to said trip device, said trip device being operative in response to the delivery of a pin from said discharge portion of said distributor for moving said latch out of engagement with said stop, and means for moving said distributor along said track from said stop disengaged by said latch to reengage said latch with a stop at an adjacent empty receptacle for delivery of the next pin thereinto.

3. The invention defined in claim 2 wherein said track is of generally heart shaped configuration and has a plurality of rounded teeth formed therein along the entire extent thereof, and wherein said distributor moving means includes a gear provided with rounded teeth engaging said teeth on said track for free rolling movement along said track.

4. The invention defined in claim 2 wherein said track is of generally heart-shaped configuration having a plurality of rounded teeth formed along the entire extent thereof, and wherein said means for moving said distributor along said track includes a gear provided with rounded teeth meshing with said teeth on said track, means mounting said gear on said discharge portion of said distributor, and means maintaining said gear against rotation when said discharge portion of said distributor is located adjacent an empty receptacle.

5. The invention defined in claim 4, wherein said discharge portion of said distributor is held in gravity biased operative relationship with said track and with said gear meshing with said teeth on said track, a swivel member mounted on said distributor adjacent said discharge portion, a swivel arm carried by said member, and a roller mounted on said arm and engaging and running along said track.

6. The invention defined in claim 1 wherein said means for locating said channel includes a bracket located adjacent the free end of the discharge portion of said channel, a substantially horizontal shaft supported by said bracket, a pulley driven by said belt mounted on said shaft, a vertical barrel member rotatably supported in said bracket, a gear attached to the top of said barrel member, a gear train connecting said gear to said shaft, including a constant torque clutch, said clutch having a resilient driving element attached to said shaft, and a driven element attached to one of the gears of said train, and a driving gear attached to the lower end of said barrel member.

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