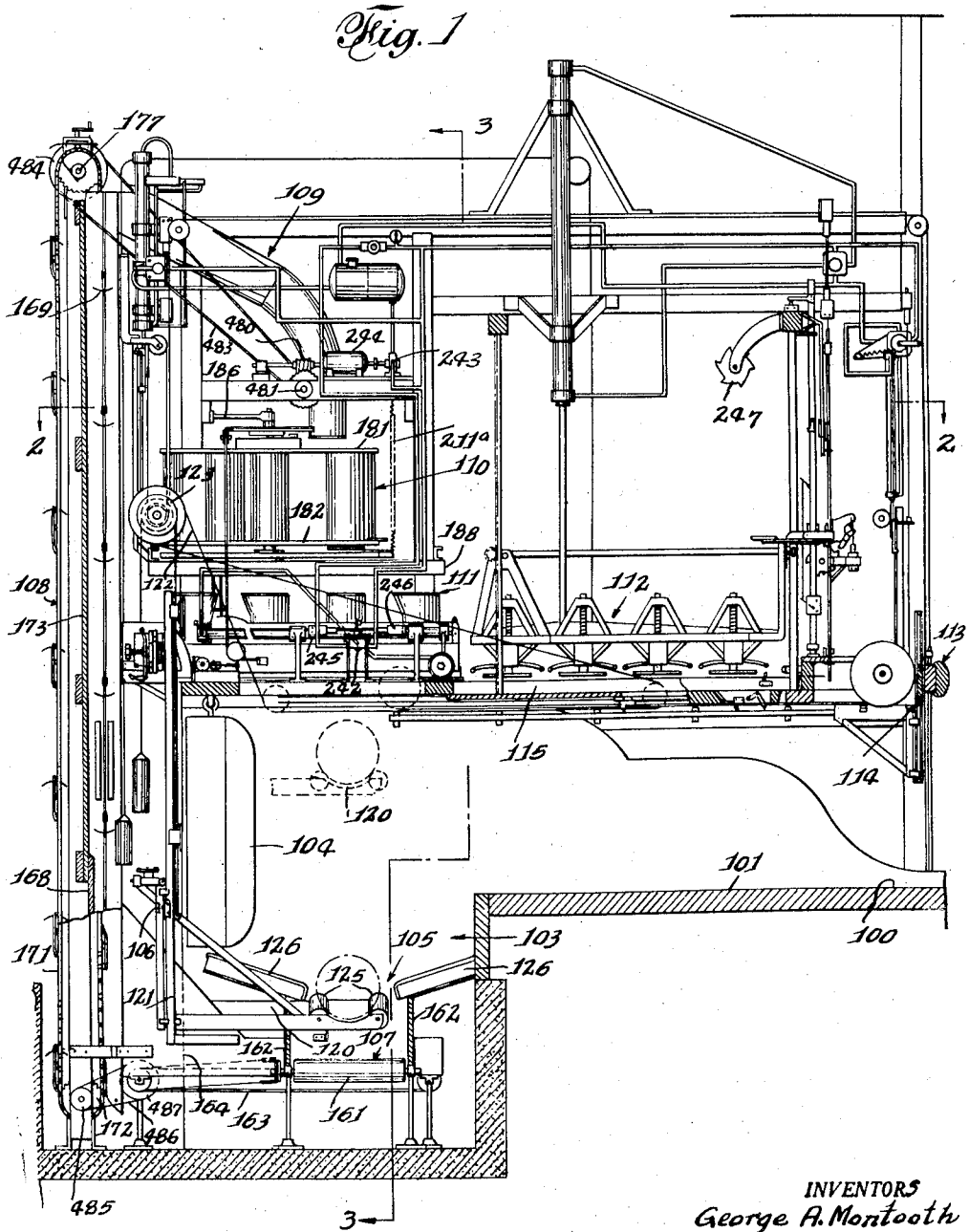
Sept. 23, 1958 G. A. MONTOOTH ET AL 2,853,300

BOWLING PIN ASSEMBLY MECHANISM

Original Filed March 26, 1946 6 Sheets-Sheet 1

Fig. 1



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BOWLING PIN ASSEMBLY MECHANISM

Original Filed March 26, 1946 6 Sheets-Sheet 2

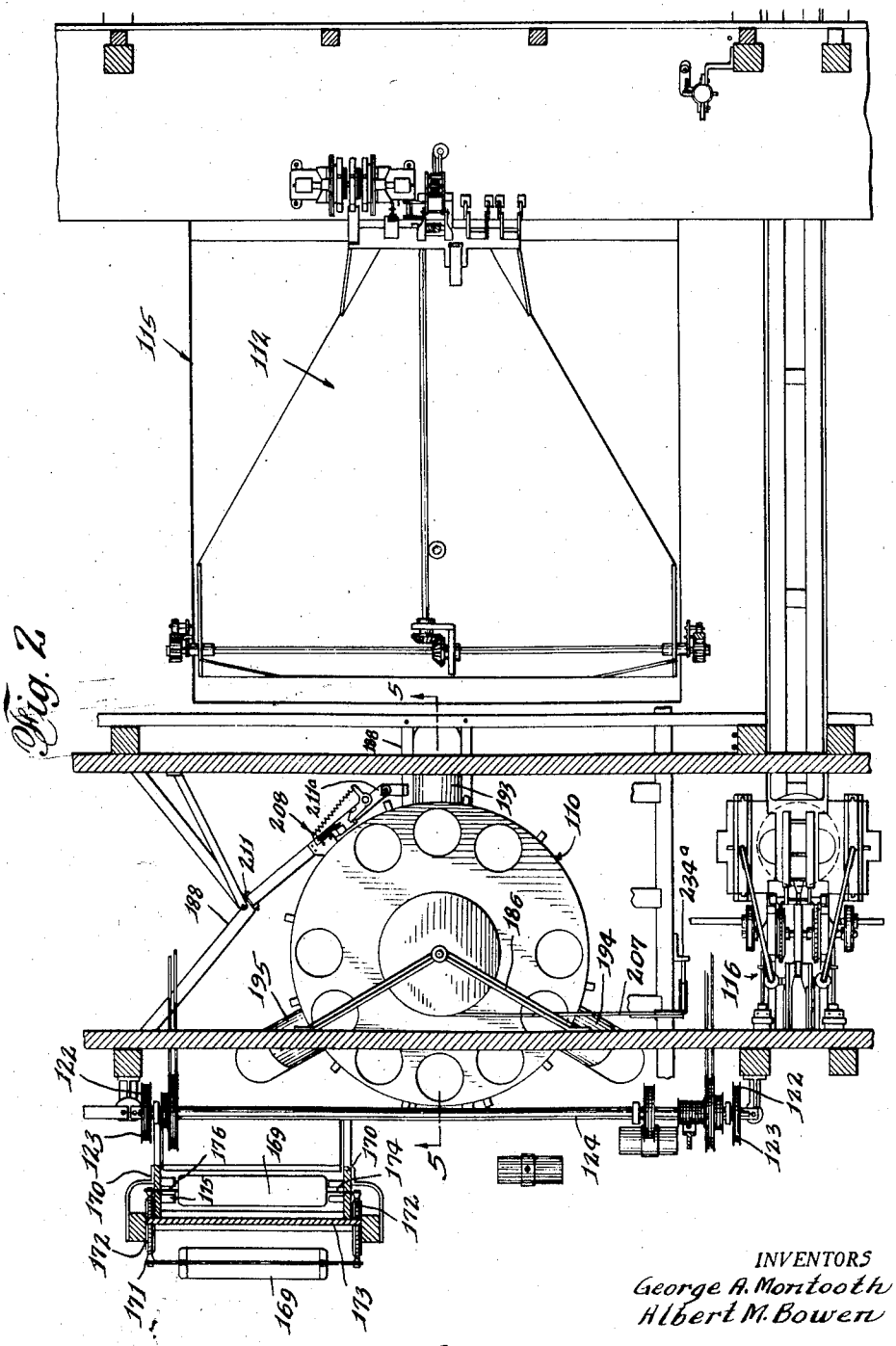


Fig. 2

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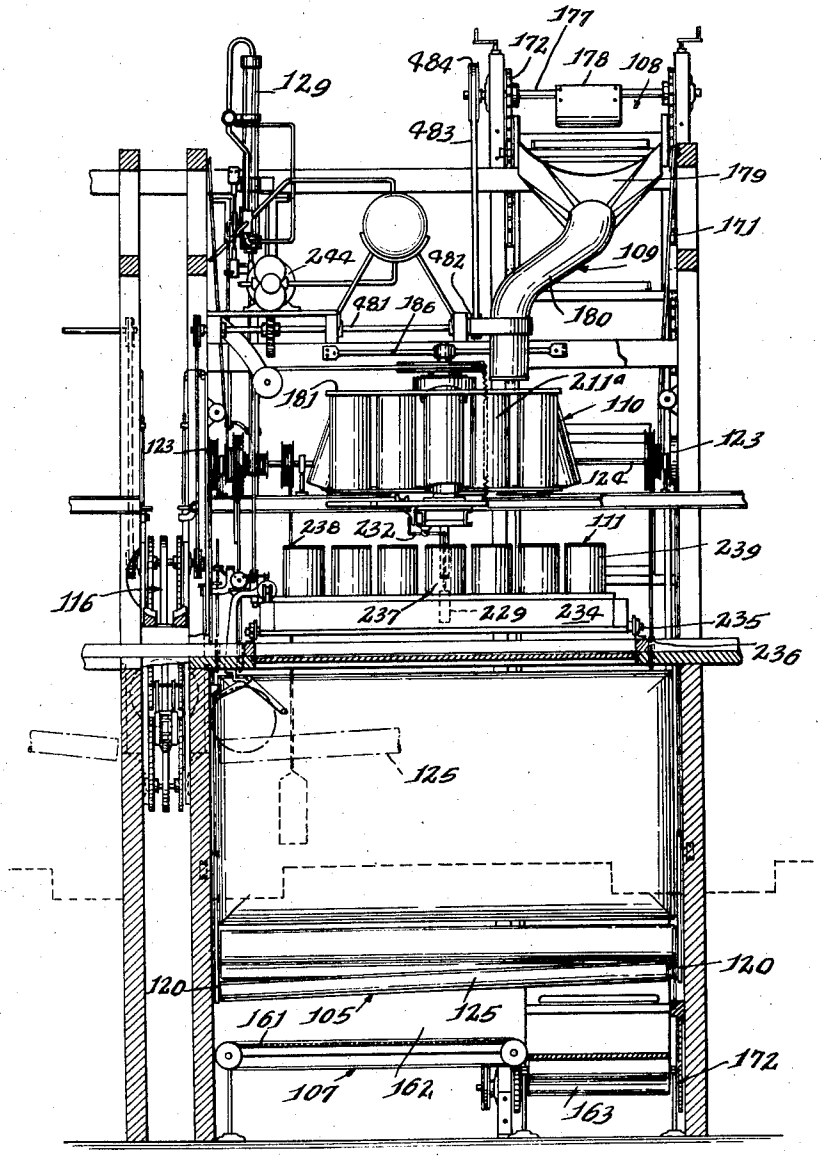
By Schroeder, Hofgren, Brady & Seaquist
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Sept. 23, 1958 G. A. MONTOOTH ET AL 2,853,300

BOWLING PIN ASSEMBLY MECHANISM

Original Filed March 26, 1946 6 Sheets-Sheet 3

Fig. 3



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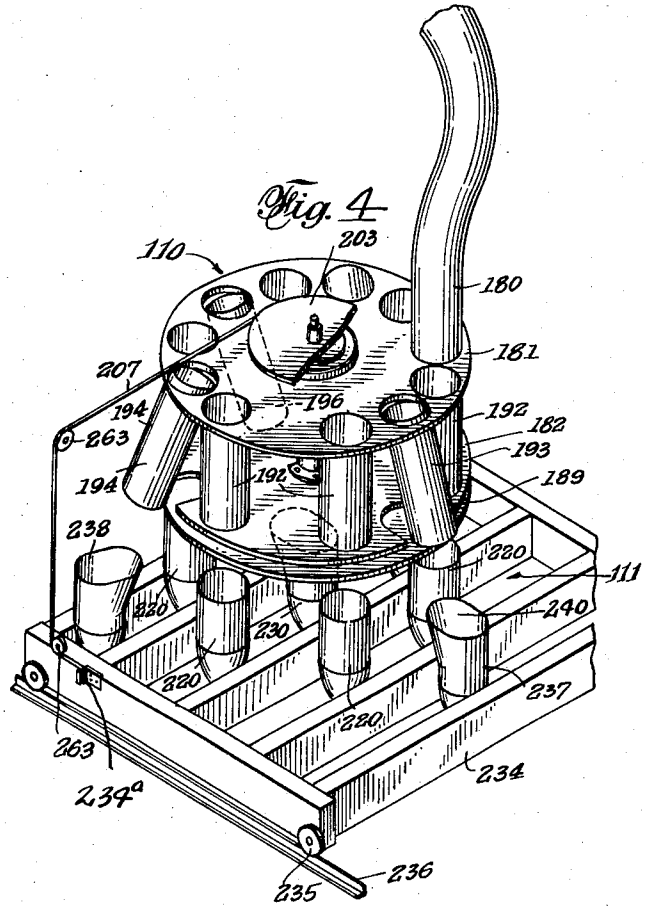
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BOWLING PIN ASSEMBLY MECHANISM

Original Filed March 26, 1946 6 Sheets-Sheet 4

Fig. 4



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Sept. 23, 1958 G. A. MONTOOTH ET AL 2,853,300

BOWLING PIN ASSEMBLY MECHANISM

Original Filed March 26, 1946 6 Sheets-Sheet 5

Fig. 5

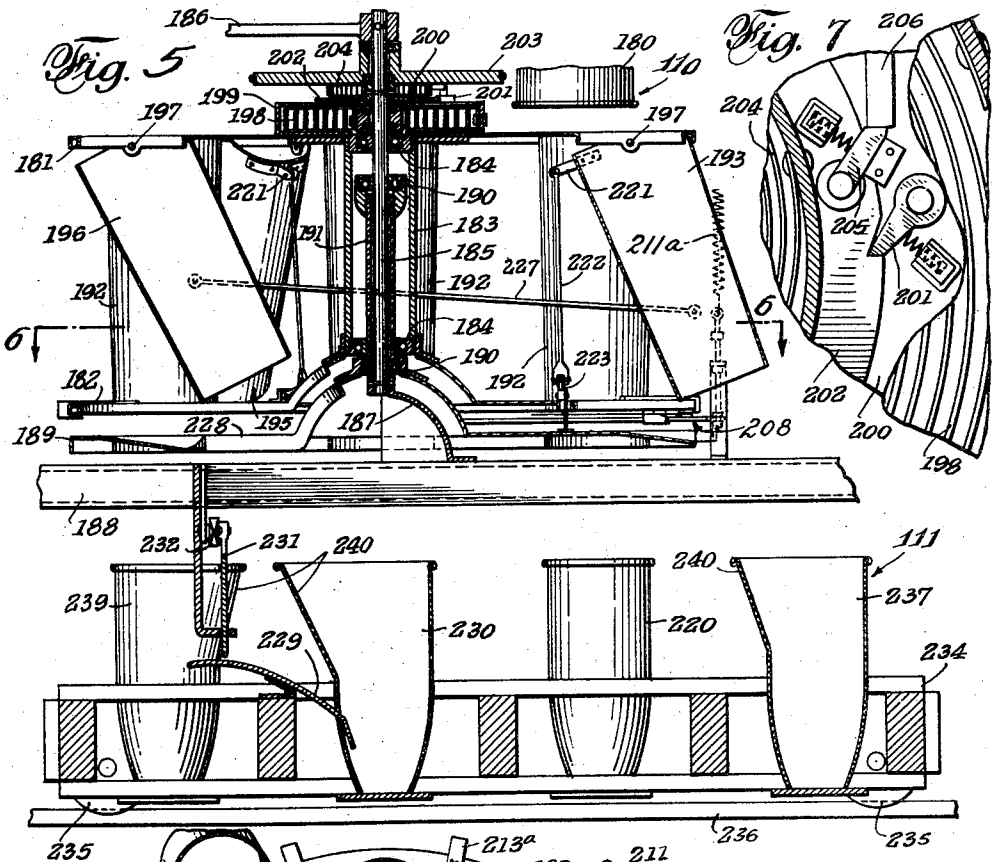
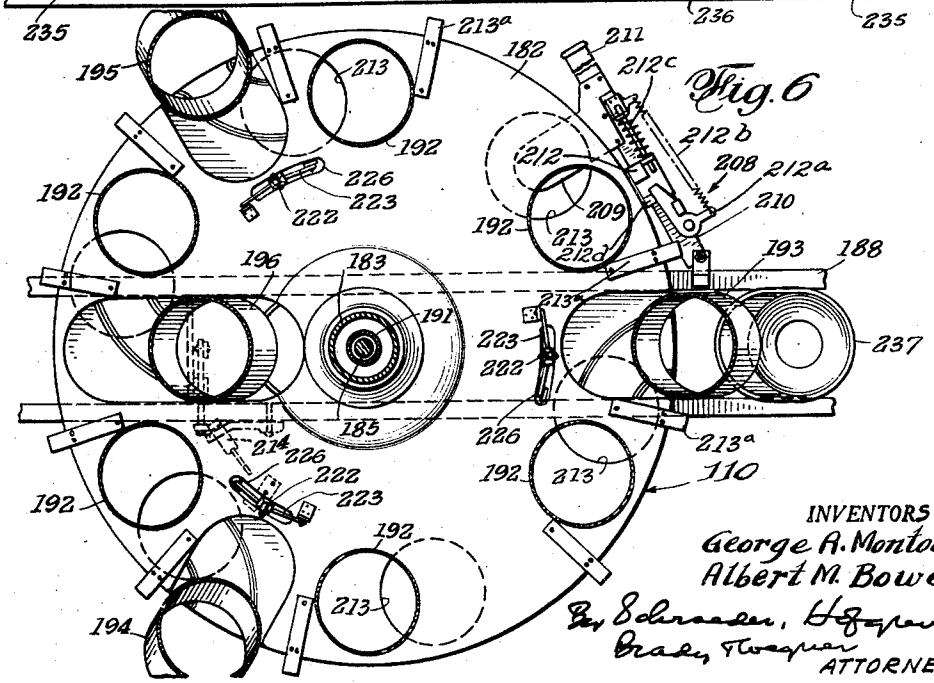


Fig. 7

Fig. 6



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BOWLING PIN ASSEMBLY MECHANISM

Original Filed March 26, 1946 6 Sheets-Sheet 6

Fig. 8

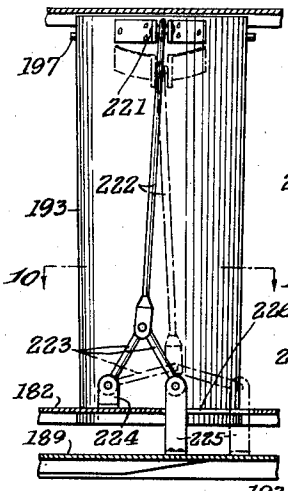


Fig. 9

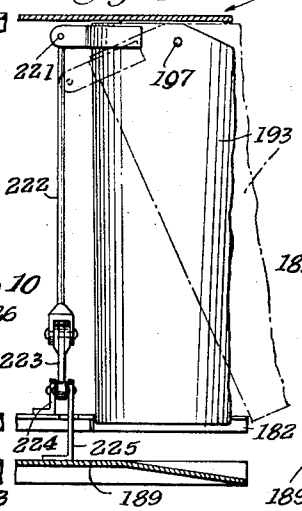


Fig. 11

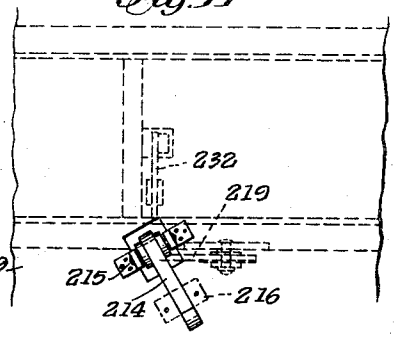


Fig. 10

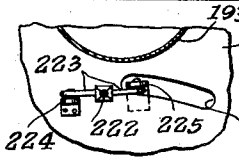


Fig. 12

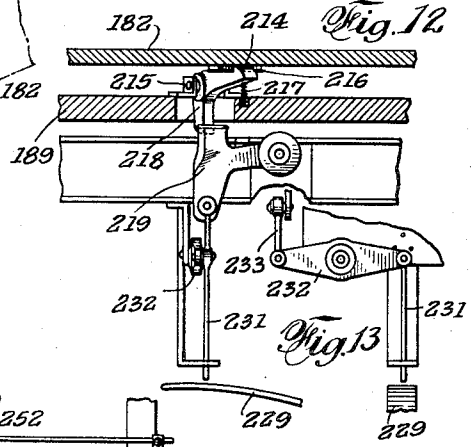


Fig. 13

Fig. 14

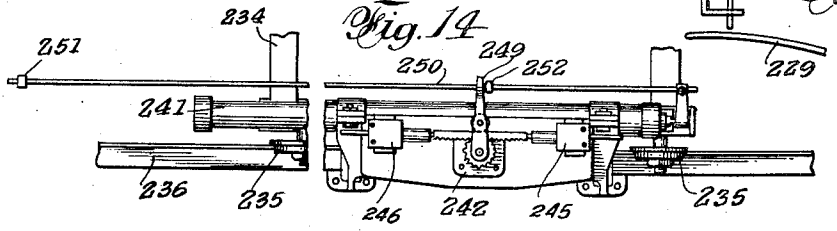
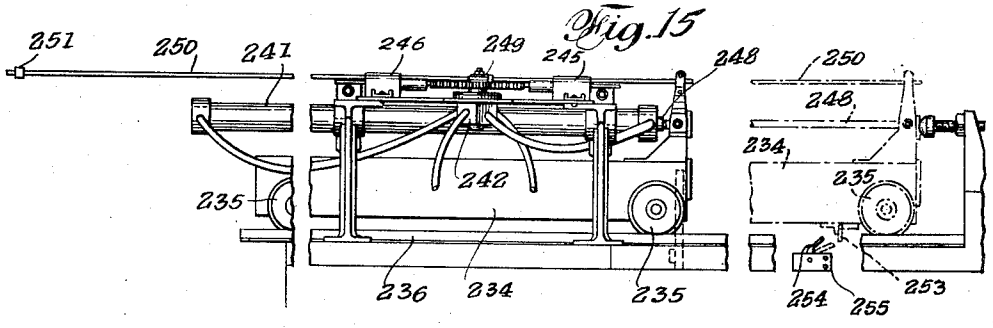


Fig. 15



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2,853,300

BOWLING PIN ASSEMBLY MECHANISM

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Original application March 26, 1946, Serial No. 657,238, now Patent No. 2,697,605, dated December 21, 1954. Divided and this application December 10, 1954, Serial No. 474,374

6 Claims. (Cl. 273—43)

This invention relates to bowling pin distributing mechanism and, more particularly, to a pin turret or magazine for assembling and holding bowling pins in a predetermined arrangement prior to their discharge for subsequent setting on an alley bed.

This application is a division of our application, Serial No. 657,238, filed March 26, 1946, now Patent No. 2,697,605, which issued December 21, 1954, entitled "Machine for Setting Pins on Bowling Alleys." Reference may be had to the parent application for a description of a complete automatic pinsetter with which the presently disclosed invention may be utilized.

An object of this invention is to provide a new and improved rotatable pin magazine or turret for receiving bowling pins sequentially which is indexed variable distances by yieldable power means.

Another object of the invention is to provide a rotatable pin turret as defined in the preceding paragraph wherein the magazine has variably-spaced pin receiving buckets and detent means are provided for stopping the magazine to complete each indexing movement, said detent means being released by entry of a pin into a bucket to permit further indexing of the magazine.

Still another object of the invention is to provide a pinsetter having means for transporting pins to an elevated point, means for directing pins from the elevated point to a magazine which comprises a plurality of pin receiving buckets arranged about a common center, means mounting some of the buckets for outward pivotal movement so as to have the pins move into a triangular arrangement when dropped, means for yieldably driving the magazine and pin-operated means responsive to the entry of a pin into a bucket to permit indexing of the turret by the yieldable power means.

A further object of the invention is to provide a pinsetter having a pin-receiving mechanism for receiving pins from a pin conveyor and storing said pins in a predetermined arrangement which comprises an indexable turret, a plurality of pin-receiving buckets on the turret arranged so as to require different increments of rotation of the turret to place succeeding buckets adjacent the discharge end of the conveyor, and means for indexing the turret by different increments including a plurality of engageable means disposed about the periphery of the turret, there being one associated with each bucket, means pivotally mounted on the machine framework engageable with each of said engageable means sequentially as the turret is indexed to hold the turret in pin-receiving positions, yieldable power means exerting a continuing force to rotate the turret and means engageable by a pin and responsive to the entry of a pin into a bucket to normally release the pivotally mounted means from engagement with one of said engageable means and permit indexing of the turret.

The objects of the invention generally set forth, together with other ancillary advantages, are attained by the construction and arrangement shown by way of illustration in the accompanying drawing, in which:

Fig. 1 is a vertical sectional view of a pinsetting mechanism showing the claimed mechanism and its relationship to the other parts of a pinsetting mechanism;

Fig. 2 is a plan sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged vertical transverse sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a diagrammatic view of the pin magazine or turret and pin tray in associated relation;

Fig. 5 is an enlarged vertical sectional view of the machine components shown in Fig. 4;

Fig. 6 is a plan sectional view taken on the line 6—6 of Fig. 5;

Fig. 7 is a greatly enlarged fragmentary sectional view of the parts shown in the upper portion of Fig. 5;

Fig. 8 is a fragmentary side view, partly in section, of a tiltable pin handling tube in the magazine shown in Fig. 5;

Fig. 9 is a similar front view thereof;

Fig. 10 is a broken plan sectional view as taken on line 10—10 of Fig. 8;

Fig. 11 is an enlarged fragmentary plan view of latching means employed in the magazine;

Fig. 12 is a fragmentary sectional and detailed side view thereof;

Fig. 13 is a fragmentary front view of a portion of the means shown in Fig. 12;

Fig. 14 is a broken plan view of mechanism for controlling the movement of the pin tray; and,

Fig. 15 is a side view thereof.

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail an illustrative embodiment of the invention with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

The alley **100** and its pin-spotting deck **101** are conventional, the alley terminating in a pit **103** provided with a back stop **104** for receiving the impact of the ball and any pins which may be propelled against it. The pit **103** is provided with means **105** for lifting a ball from a low point in the pit to an elevated point from which it is discharged for return or delivery to the bowler, with starting switch means **106** initiating the synchronous movement of various portions of the mechanism. The means **107** are provided for moving pins in the pit for elevation therefrom by a pin lift conveyor **108**. The latter serves to move the pins to an elevated point of the mechanism for discharge into a chute **109**. A pin magazine **110**, more fully described hereinafter, receives the pins from the chute **109** and, when filled with a full complement of ten pins, discharges them into a pin spotting tray **111** therebeneath. Said tray is movable to a position over the deck **101** for extraction of the pins therefrom by a pin setting rack **112**. The rack not only serves to receive a full complement of pins from the tray **111** and deposit them in proper spotted position on the deck **101**, but also serves to engage and lift any pins left standing after a ball has been rolled so that said deck can be swept clear of fallen pins. The rack re-deposits such pins in the same positions from which they have been lifted subsequent to clearing of the deck so that they are ready for the second ball to be rolled.

The mechanism further includes a guard **113** which has a normal elevated position and is moved to a position across the alley in front of the deck during the period of operation of the mechanism to protect the same against injury by a prematurely rolled ball. A

squeegee or deck clearing device **114** moves vertically with the guard and also moves rearwardly to sweep the deck of fallen pins after the pin setting rack has lifted standing pins. There is also provided a pin deck cover **115** suitably elevated with respect to the deck **101** to give ample pin clearance. Said cover **115** is normally closed to protect the rack **112** and other mechanism from injury by flying pins but opens synchronously with the downward movement of the guard **113** so that the rack **112** may move vertically through the resulting opening.

The mechanism also provides means **116** for receiving a ball from the lift **105** for return thereof to the bowler. The particular means **116** shown contemplates mechanism which serves adjacent alleys.

Ball lift 105

The ball lift **105** shown best in Figs. 1 and 3 comprises a pair of side brackets **120** mounted for vertical movement on tracks **121** by means of belts **122** trained on pulleys **123** mounted on shaft **124** which may be driven from a cylinder **129** through suitable connections. The brackets **120** support a pair of spaced rollers **125** which are arranged transversely in the pit and at a slight angle from side to side as shown in Fig. 3. A ball leaving the deck **101** will strike back stop **104** and will fall on either of the sloping walls **126** to be guided thereby to fall on said rollers. Pins falling into the pit will be similarly guided. However, the spacing of the rollers **125** is such that they will support a ball but allow pins to fall between them. Since some of the pins may assume a transverse position across the rollers, one or both may be caused to rotate as they are elevated from the full line position to the broken line position shown in Figs. 1 and 3 to dislodge such transverse pins and induce them to fall between the rollers. As the rollers are raised, the ball naturally rolls to the low side from where it is received by the ball delivery mechanism **116**.

Mechanism 107 for moving the pins in the pit

Figs. 1 and 3 best show this component. Beneath the rollers **125** there is provided a belt conveyor **161** arranged transversely between walls **162** to move pins falling thereon from one side of the pit toward a second belt conveyor **163** which operates to move the pins toward the rear of the pit. The conveyors have a generally L-shaped arrangement to receive the pins and move them toward the lift conveyor **108** which is placed at one side of the pit as seen in Fig. 3. The conveyors operate continuously during the operation of the machine. The wall **162** nearer the deck **101** extends completely across the pit and the other terminates at the conveyor **163** which may be provided with pin retaining walls **164** extending to the conveyor **108**.

A hopper may be provided to receive the pins as they are dropped by the conveyor **163** and spaced shelves **169** on the conveyor **108** may move up through the hopper and pick up a pin for elevation. This operation is more fully set forth in the parent application.

Pin lift conveyor 108

Figs. 1, 2, and 3 best show this component of the machine. The conveyor comprises a vertical back wall **168** arranged between upper extensions **170** of the walls **164**, a pair of sprocket chains **171** disposed on the outer sides of said extensions, sprockets **172** about which the chains are trained, and the mentioned shelves **169** carried in spaced relation by said chains so that they move continuously during the operation of the machine. The wall is provided with an upper somewhat set back extension **173** so that if a pin remains on a shelf until the set back wall is reached, it will then have room to center itself on the shelf for transfer to the upper end of the pin lift.

Bars **174** connect the chains and their ends move in slots **176** formed in the walls **170**. Each bar **174** has a shelf **169**. Means are provided for centering a pin on its shelf and simply comprise spring fingers **175** on each wall **170** designed to slide a pin to a central position on its shelf.

The conveyor moves so that the shelves travel upwardly at the front of the walls **168** and **173**. The upper sprockets **172** are mounted on a shaft **177** on which is fixed a paddle **178**. The rotation of the paddle is arranged to synchronize with the movement of the shelves to cause said paddle to dislodge a pin as a shelf bearing it moves by. Inasmuch as the paddle will engage the thick part or butt of the pin, the latter will be pushed off its shelf butt first to fall into the pin chute **109**.

Pin chute 109

The pin chute is best shown in Figs. 1, 3 and 4 and comprises a fixed sheet metal member having a wide pin receiving part **179** which is gradually reduced or tapered to terminate in a tubular portion **180** leading to the pin magazine **110**. The chute walls are so sloped and arranged to properly guide a pin, butt first, as it falls from its elevating shelf **169** to the magazine **110**. The pin chute **109** and pin conveyor **108** form a pin conveying mechanism for delivering pins to the magazine **110**.

Pin magazine or turret 110

The pin magazine or turret comprises a frame formed of a top circular disc **181** and a somewhat similar bottom disc **182** connected by a spacing tube **183**. This frame, by means of antifriction bearings **184**, is mounted for rotation on a vertical shaft **185** fixedly supported between a bracket **186** on the framing of the machine and a semi-circular domed bracket **187** mounted on a horizontal frame **188** carried by the framing of the machine. A third circular disc **189** is disposed between the disc **182** and frame **188** and is mounted for rotation on shaft **185** by antifriction bearings **190**. The upper of said bearings is carried by a sleeve **191** extending through the lower of the bearings **184**.

In circular arrangement between the discs **181** and **182** there is provided ten tubes or buckets of a size to receive and accommodate a bowling pin. Six of these tubes **192** have a respective arrangement corresponding to the two, three, four, six, eight and nine spots of a set of pins on an alley deck. These tubes are fixed between discs **181** and **182**. The other four tubes **193**, **194**, **195** and **196** are each arranged to swing on a pivot **197** in the disc **181** so that they can be directed toward the one, seven, ten and five spots, respectively. Registering openings are provided in the discs **181** and **182** so that pins from the chute **109** may fall successively into the tubes **192** to **196**, inclusive, and come to rest upon disc **189**. Accordingly, there is provided means for intermittently rotating the magazine frame as a pin enters a tube. The three forward tubes **192** and **193** are spaced apart from the remaining tubes a distance greater than the spacing between tubes so that the rotation or indexing movement of the turret will vary.

The power means for rotating or indexing the magazine is provided by a clock spring **198** having its outer convolution secured to a spring case **199** rigidly secured to disc **181** and its inner convolution to a spring winding disc **200** rotatable on the shaft **185**. The winding disc carries a dog **201** associated with a ratchet **202** fixed on the shaft **185**. Above the ratchet, a winding pulley **203** is mounted for rotation on said shaft and a smaller clock spring **204** has its outer convolution fixed to the pulley and the inner convolution fixed to the shaft. The underside of the winding pulley **203**, not shown in Fig. 7, carries a dog **205** associated with a stop **206** on the winding disc **200**.

As the winding pulley is rotated by movement of a cable **207**, the dog **205** engages a stop **206** to drive the winding disc **200** and store energy in the spring **198**. At the end of the winding movement of disc **200**, its dog **201**

will engage a notch in ratchet **202** to hold the spring **198** from unwinding as the pulley **203** rotates reversely under power of spring **204**. Upon release of the pin magazine by a pin dropping thereinto, the spring **198** will cause the magazine to rotate until stopped.

The magazine is held latched by a catch indicated generally at **208** which is carried by frame **188** and embodies pin engageable means in the form of a trip paddle **209** located to be depressed by a pin as it falls into one of tubes **192** to **196**, inclusive, which is in register therewith. The paddle is carried by a catch bar **210** pivoted at **211** (Fig. 2) to allow the paddle to be depressed and the paddle is yieldingly held in an upper position by spring **211***a* (Fig. 5). Upon depression of the paddle, the entire catch bar **210** is depressed to cause a block **212** on the catch bar to be moved out of engagement with a stop lug **213***a* on disc **182**. One of these stop lugs **213***a* is associated with each pin tube and is variably spaced in the same manner as the tubes **192** to **196**. Upon release of the catch bar by a falling pin, the spring **198** becomes effective to rotate the pin magazine so that the next succeeding tube is registered with the paddle **209**. The catch **208** has a finger **212***a* pivoted thereon and urged counter-clockwise to a position behind the lug **213***a* by a spring **212***b* in order to prevent inadvertent reverse movement of the magazine. A lug **212***d* on the catch bar is spaced from the block **212** and of a lesser height than the block **212** so that a lug **213***a* may freely pass thereover when the magazine rotates. The lug **212***d* limits counter-clockwise movement of the finger **212***a*. The block **212** is yieldingly held in position by the spring **212***c* which is sufficiently strong to prevent unintentional movement of the block **212** but yields when the lug **213***a* hits the block **212**.

The catch **208** functions to permit movement of the magazine step-by-step in order to receive pins one-by-one from the chute **109**. Each time that a pin enters into one of the tubes **192—196**, the paddle **209** is momentarily depressed by the pin to lower the parts **212—212***d* and thus free the magazine for rotation by the spring **198** until the next lug **213***a* engages with the block **212** which has been raised to blocking position by the spring **211***a*. The last referred to lug **213***a* prior to engagement with the block **212** will engage the finger **212***a* and cause it to pivot in a clockwise direction against the action of spring **212***b*. As the lug **213***a* moves beyond the finger **212***a*, the finger will snap in behind the lug **213***a*.

The disc **189** is provided with openings **213** which are normally out of register with the tubes **192** to **196** so that pins in said tubes are supported by said disc **189**. The discs **182** and **189** are normally latched to move together as pins are dropped into the pin tubes. This latching means, which is best seen in Figs. 11 and 12, comprises a latch lever **214** carried by a bracket **215** on the upper side of disc **189** and block **216** on the under side of the disc **182**. A spring **217** normally holds the latch lever engaged with the block so that rotation of the pin magazine is imparted to the disc **189**. The latch lever is further provided with a downreaching finger **218** which is in the path of movement of a trip member **219** which is located to engage the finger when the last or tenth pin is dropped into the magazine. The member **219**, through engagement with finger **218**, holds the disc **189** until said member is withdrawn. The disc **189** will thus be held from further rotation while the spring **198** is effective to continue rotation of the magazine, and the fixed tubes **192** are aligned with the openings **213** so that pins in said tubes can fall through said openings into aligned pin receiving cans **220** carried by the pin spotting tray **111**.

The above described relative motion of the magazine and disc **189** also causes tilting of tubes **193** to **196**, inclusive. As seen in Figs. 8 and 9, each of said tubes, except tube **196**, is provided with an arm **221** near its top end. A link **222** is connected between said arm and a pair of toggle links **223**, one of which is connected to a bracket **224** on disc **182** and the other to a bracket **225** on disc **189** which extends through a suitable arcuate slot **226** in disc **182**. The relative movement of the discs **182** and **189** causes the bracket **224** to move away from the bracket **225** resulting in a spreading of the toggle links **223**, a downward pull on link **222** and a consequent tilting of the pin tubes on their pivots **197**. A simple link connection **227** between tubes **193** and **196** is provided and the tiltable tubes are so arranged as to direct pins into cans in the pin tray which correspond to the one, five, seven and ten spots of a set of bowling pins in position.

When the disc **189** is stopped by trip **219** and the disc **182** continues to rotate to effect dropping of the pins into the spotting tray **111**, the "five" pin, i. e., the pin which was held in tube **196**, falls through an opening **228** in disc **189**. A trip lever **229** in the can **230** receiving said "five" pin, is depressed to raise pin **231**, rock lever **232** and depress link **233** connected with trip **219**. Depressing link **233** withdraws the trip from engagement with latch lever **214** allowing disc **189** to continue its rotation, this time together with disc **182**, until the next succeeding stop lug **213***a* is engaged by catch **208** to stop disc **182**. Because of its momentum as imparted particularly by the inertia of the tilted tubes, disc **189** continues to rotate until latch lever **214** is again caught by block **216**. The tubular portion **180** of the chute is positioned to be over a blank portion of the magazine when the latter is discharging its pins, as shown in Fig. 4. Any pin discharged into the chute will, therefore, come to rest on the top of plate **181** to be held until the magazine returns to its reloading position. The pin will then fall into one of the tubes as before described and the magazine will receive pins in successive tubes.

Pin spotting tray 111

Figs. 1, 3, 4 and 5 show this component of the machine which is normally located directly beneath the magazine for receiving pins therefrom. Said tray is movable to a position above the deck **101** so that pins in said tray may be upwardly extracted by the pin setting rack **112** for subsequent placing of the pins on their proper spots on deck **101**.

The tray comprises a frame **234** mounted on wheels **235** to travel on tracks **236** between its pin receiving position and its pin extracting position. The frame **234** mounts the mentioned cans **220** for receiving pins from the unpivoted tubes **192** of the magazine, the mentioned can **230** for receiving a pin from tube **196** and cans **237**, **238** and **239** for receiving pins from pivoted tubes **193**, **194** and **195**, respectively. Inasmuch as the pins falling into cans **230**, **237**, **238** and **239** are directed at an angle, each of said cans is formed with a chute-like portion **240** for suitably guiding pins falling into them. Ten cans comprise a full complement and their relative positions accord with the spot positions of pins on an alley deck.

The "five" pin falling from tube **196** into can **230** is arranged to have a slightly greater distance to fall than the remaining nine pins and it is for this reason that the mentioned trip lever **229** is arranged, in association with can **230**, to actuate the trip **219**.

The means provided for moving the tray along its tracks is shown best in Figs. 14 and 15. Said means comprises a hydraulic or other fluid cylinder **241** arranged for two-way operation, under control of a four-way valve **242**, by fluid pressure supplied by a pump **243** driven by a motor **244** (Fig. 1). The valve **242** is operated by solenoids **245** and **246**. The latter is controlled by switch **247** (Fig. 1) to shift valve **242** to cause pressure in cylinder **241** to actuate piston **248** and cause the tray to move from its loading to its pin extracting position. The switch **247** is positioned for operation by the setting rack **112**.

A lever arm **249** on the valve **242** is associated with a control rod **250** having a stop collar **251** and carried by the tray frame **234**. At the end of the mentioned movement of the tray, said collar **251** will engage lever arm

249 to move it and thus close valve 242. After the pins are extracted from the tray by the pin setting rack 112, the switch 247 closes the circuit to solenoid 245 shifting the valve 242 to cause fluid pressure in cylinder 241 to retract the tray. At the end of its latter movement, a stop collar 252, on control rod 250, acts to close valve 242.

Fig. 15 shows a trigger 253 mounted on the tray frame 234 to engage the switch lever 254 of a switch 255 mounted in a stationary position near the forward end of one of the tracks 236. When the tray moves into its pin delivering position, the trigger 253 engages switch lever 254 to close switch 255 which is normally open and control the operation of the pin setting rack 112 in synchrony with the forward delivery movement of the tray. The tray can overrun the switch lever 254 since, upon return movement of the tray, the trigger 253 can tilt past the now open or raised switch lever 254.

The mentioned cable 207 for winding the spring 198 is trained over suitable pulleys 263 and connected to the tray frame 234 at 234*a* so that said spring 198 is wound each time the tray moves forward as above described.

The motor 244 is connected to drive the conveyor 108 by means of a worm and worm wheel drive 480 turning a shaft 481 having a pulley 482 which drives a belt 483 to drive shaft 177 by means of pulley 484. The shaft for the lower conveyor sprockets 172 has a pulley 485 driving a belt 486 and a pulley 487 for the pit conveyor 107.

From the above described embodiment of the invention, it will be seen that the pin sorting means 107 and the pin lifting conveyor 108, operate continually for the purpose of bringing pins to the magazine 110. The pin magazine is self-operated by dropping of pins into it but its energy is provided through the movement of the pin tray 111. The machine is designed to handle two sets or twenty pins, one set being in play while the other is being handled by the machine.

We claim:

1. A bowling pin assembling mechanism for receiving pins sequentially from a source and holding the pins in a predetermined pattern comprising, in combination, a supporting framework, a turret mounted for rotation about a generally vertical axis, a plurality of pin receiving buckets mounted on the turret, the buckets being arranged to have their upper pin receiving ends lie in a circular path which passes under the source of pins and at least some of the buckets being variably spaced from the remainder of the buckets, spring means for yieldably rotating the turret, a plurality of detents arranged around the turret, there being a detent associated with each bucket and the spacing between the detents corresponding to that between the buckets, a paddle member mounted on the framework and spring urged upwardly to a position to engage each of the detents sequentially as the turret is rotated, the free end of the paddle member extending under the bucket which is receiving a pin from the source so that entry of a pin into a bucket will depress the paddle member to release the detent and cause the spring means to rotate the turret until the paddle member engages the next detent, a pin receiving tray disposed beneath the turret for receiving pins from the turret, means mounting the tray for generally horizontal movement, and means responsive to horizontal movement of the tray for tensioning said spring means.

2. A device as defined in claim 1, in which the turret has a bottom plate provided with openings normally offset from the bottoms of the pin receiving buckets, and having means responsive to rotation of the turret on entry of a tenth pin into the turret to cause relative movement between the bottom plate and the buckets to align the openings in the bottom plate with the bottoms of the buckets, and means responsive to the relative movement for tilting certain of said buckets to an inclined position.

3. A bowling pin assembling mechanism for receiving pins sequentially from a source and holding the pins in a predetermined pattern comprising, in combination, a supporting framework, a turret mounted on the framework for rotation about a generally vertical axis, a plurality of pin receiving members mounted on the turret, the pin receiving members being arranged to have their upper pin receiving ends lie in a generally circular path which passes adjacent the source of pins, means for rotating the turret including trip means operable by each pin as it is positioned in a pin receiving member to index the turret, a pin supporting element associated with the turret having spaced apart areas for supporting the bottoms of pins in the buckets and having openings between the pin supporting areas normally off-set from the bottoms of the pin receiving members, latch means positively locking the pin supporting element for rotation with the turret with the openings in the pin supporting element in the normally off-set relationship to the pin receiving members, means for releasing the latch means after the entry of the final pin into the turret to permit relative movement between the pin supporting element and the turret to align the openings in the pin supporting element with the bottoms of the pin receiving members, means mounting certain of said pin receiving members fixedly on said turret, means mounting the other pin receiving members on said turret for tilting movement, and means responsive to relative movement between the pin supporting element and the turret for tilting the tiltable pin receiving members to inclined positions.

4. A pin assembly mechanism for receiving pins from a source and storing the pins in a predetermined arrangement prior to discharge for resetting on an alley bed, comprising, in combination, a supporting frame, an indexable turret mounted on the frame for rotation about an upwardly extending axis, a plurality of pin receiving pockets on the turret of which some are variably spaced from the others so as to require variable rotation of the turret to successively place succeeding pockets under said source, means for indexing said turret by variable increments including a constantly active yieldable drive means and a releasable stop means, operable to alternately stop the turret with successive pockets positioned under said source and release the turret for rotation on receipt of successive pins, said yieldable drive means comprising, a coiled spring having one end connected to said turret, a spring winding element connected to the other end of the spring and mounted for rotation on said frame in the direction of turret rotation, means for rotating said winding element through at least one complete revolution to wind said spring sufficiently to effect at least one complete rotation of said turret, and means to prevent reverse rotation of said winding element after said spring is wound.

5. The combination as defined in claim 4, wherein the means for rotating said winding element comprises a winding pulley rotatable on said frame in the direction of rotation of said winding element, means on the winding pulley engageable with said winding element to drive the latter through at least a complete revolution, and releasable from the winding element for return to a starting position, and a coiled spring having one end connected to said winding pulley and the other end fixed on said frame for returning the winding pulley to its starting position after winding said turret driving spring.

6. In a pin setting machine, mechanical pin gathering means including a rotatable magazine having a plurality of pin receiving tubes arranged about the axis of rotation of the magazine, means mounting certain of said tubes stationarily on said magazine, means mounting the other tubes on the magazine for pivotal movement, means for indexing the magazine to successively position the tubes to receive pins from a source, means for retaining the pins in the tubes, means for actuating the retaining means to release the pins, and mechanical linkage means interconnecting said retaining means and said pivotal tubes for

effecting pivotal movement of the tubes simultaneously with release of the pins to effect dropping of said pins from the magazine in a pattern differing from their arrangement in the magazine.

References Cited in the file of this patent

UNITED STATES PATENTS

975,445 McFarland ---------- Nov. 15, 1910
1,375,835 Fairchild ---------- Apr. 26, 1921
1,524,241 Hedenskoog ---------- Jan. 27, 1925
1,590,124 Roble ---------- June 22, 1926
2,015,428 Hedenskoog ---------- Sept. 24, 1935
2,388,708 Bates ---------- Nov. 13, 1945
2,550,835 MacFarland ---------- May 1, 1951