AUTOMATIC PRESSING MACHINE

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This invention relates to an automatic pressing machine, and is more particularly concerned with a machine for pressing successive cuffs which are subsequently used on men's shirts, the cuffs being pressed prior to the time they are installed on the shirts.

In the manufacture of men's shirts and the like, cuffs for shirts are produced by sewing a double and a single piece of relatively rectangular cloth together along three edges. The joined pieces are then inverted, pressed in the inverted condition, thus leaving a fourth edge open for the receipt of the end of the sleeve. Next, the end of the sleeve of the shirt is placed in the open end of the cuff and additional stitching is provided to join the pieces of the cuff and the end of the sleeve together whereby the pieces of the cuff sandwich the sleeve end in an overlapping arrangement.

In the pressing of the cuffs, it is usually very difficult to retain the cuff in precisely the exact condition such that the junction, at the stitching between the pieces of cuff, forms the outer edge of the cuff.

In the past, machines have been devised for performing this operation. Usually such machines include a mechanism which arranges the cuff to a position between a platen and a pressing member; however, such machines are not readily adaptable to varying size cuffs and do not permit the rapid installation and discharge of such cuffs. Further, difficulty arises in retaining the cuff on the machine in the right condition on the machine. Such prior art machines are also expensive and require considerable skill on the part of the operator in order to permit the machine to function effectively.

To obviate the difficulties encountered by devices of the prior art and to provide a simple, yet versatile and effective device for automatically pressing cuffs, I have devised a cuff pressing machine which includes a base which supports for rotation a turn-table provided with a plurality of cuff carrying members extending radially therefrom. Each cuff carrying member includes a pair of cuff retaining plates which are adjustable for all sizes of cuffs and are movable toward and away from each other determined by the radial position of the carrying member. At the loading station, the plates are relatively close to each other and are automatically withdrawn from each other as the turn-table is indexed. The turntable itself is indexed in timed predetermined increments so that each cuff carrying member will be stopped at each of several positions during a complete cycle of the machine. After the loading position, there is a sprinkling position wherein the cuff receives water. The next position is the pressing position wherein the cuff is pressed on the plates of the cuff carrying member. Next, the turntable is indexed to a discharge position where the cuffs are automatically discharged from the machine.

Accordingly, it is a general object of the present invention to provide a machine which is inexpensive to manufacture, durable in structure and efficient in operation.

A more specific object of the present invention is to provide a cuff pressing machine wherein cuffs are automatically and sequentially processed so as to press each cuff and thereafter automatically discharge the cuff from the machine.

Another object of the present invention is to provide a cuff pressing machine which may be adjusted to a predetermined size of cuff in a quick and easy manner.

Another object of the present invention is to provide a cuff pressing machine which will rapidly and substantially automatically press successive cuffs accurately so that the junction formed by the pieces of cuff material will substantially always be arranged to provide the outer edges of the semi-finished cuff.

Another object of the present invention is to provide a machine which may be operated for the purposes hereafter described by an unskilled or semi-skilled laborer.

Another object of the present invention is to provide a process by which successive cuffs may be quickly, easily and effectively pressed prior to the time that they are installed on a shirt.

Other objects, features and advantages of the present invention will become apparent from the following description when taken in conjunction with the accompanying drawings wherein like characters of reference designate corresponding parts throughout the several views and wherein:

FIG. 1 is a plan view of a machine constructed in accordance with the present invention.

FIG. 2 is a front elevation view of the machine shown in FIG. 1.

FIG. 3 is a fragmentary cross sectional view taken along line 3—3 in FIG. 2.

FIG. 4 is an enlarged view of a detail showing the mechanism for adjusting the position of one of the cuff retaining plates of the cuff carrying member with respect to the other plate thereof.

FIG. 5 is a cross sectional view taken along line 5—5 in FIG. 4.

FIG. 6 is an enlarged view of a detail showing the pin engaging assembly which is carried by the air cylinder for indexing the turntable a predetermined radial amount.

FIG. 7 is a schematic view of the hydraulic system of the present invention.

Referring now in detail to the embodiment chosen for the purpose of illustrating the present invention, it being understood that the invention in its broader aspects is not limited to the exact details disclosed in the drawings, numeral 10 denotes the base of the cuff pressing machine of the present invention. Base 10 is a flat metal plate which is generally rectangular in shape and has a front edge 11, sides 12 and 13, and a back edge 14. A pivot supporting platform 15 is formed integrally with base 10 projects from side 12 for purposes to be described hereinafter. Mounted centrally on base 10 and extending upwardly therefrom is a central pivot post 16, the upper end of which is of reduced diameter to provide a concentrically mounted pivot pin 17 on the upper end of the post 16 and a shoulder therebetween. A turntable 18 which is formed of a flat square metal plate is provided with a central bore through which the pivot pin 17 projects. The turntable 18 rides upon the shoulder formed between the post 16 and pin 17 and is secured in place by a collar 19 which is removably carried by pin 17, the collar 19 being secured in place by a set screw 20. The corners of the turntable 18 are rounded as indicated at numeral 21 so that no portion of the turntable protrudes beyond the confines of base 10. It is therefore seen that I have provided a turntable 18 which is arranged in spaced parallel relationship with respect to base 10 and is adapted to be rotated about its vertical axis.

For the purpose of indexing the turntable 18, I have provided an indexing assembly which includes a pivot pin 30 extending upwardly from the pivot supporting platform 15. A double acting air cylinder 31 which is pivotally mounted by one end to pivot pin 30 extends inwardly across the upper surface of base 10. This air cylinder 31 is provided with the usual piston 32, seen in FIG. 7, and a piston rod 33. On the end of piston rod 33 is a clamp carrying plate 34 which extends in a horizontal plane essentially parallel to and spaced from both base 10 and turntable 18. As best seen in FIG. 6, the side of plate...
34 which is adjacent post 16 is provided with an upstanding pivot pin 35 which carries a lever 36. The lever 36 normally extends outwardly of the plate 34 in the position shown in FIG. 6 and is adapted to pivot in a counterclockwise direction from that position, when the tension of a spring 37, extending between the plate 34 and lever 36, is overcome. The outer rear edges of each lever 36 is arranged to provide a camming surface 38, the purpose of which will be described in more detail later.

Pivoted mounted on the end of the lever 36 and normally extending parallel to the line of travel of piston rod 33, there is a clamping assembly which includes a pair of cooperating clamping jaws 39, 39' which are pivotally connected together and are urged to their closed position, as shown in FIG. 6, by a spring 41 mounted between the two jaws 39, 39'. The opposed inner central surfaces of the jaws 39, 39' are concaved so as to define a pin receiving recess 42. In their normal position, the outer ends of jaws 39, 39' are spaced apart slightly so as to provide an opening 43 through which a pin of proper size may be urged, thereby urging the jaws open. The jaws 39 is provided with an inwardly extending base 44 which is pivotally carried by a pivot pin 45 on the end portion of lever 36.

Adjacent the clamping assembly, the lever 36 is provided with a pair of transversely aligned pins 46, 46' between which one arm of an L-shaped leaf spring 47 is retained. The other arm of the leaf spring 47 acts against a pin 48 on base 44 so as to urge the clamping assembly in a clockwise direction; however, a block 49 on lever 36 prevents clockwise rotation of the clamping assembly. Thus it is seen that the clamping assembly may be rotated against the spring tension of leaf spring 47 in a counterclockwise direction.

As best seen in FIGS. 2 and 3, four radially evenly spaced, downwardly extending indexing pins 50 project from the lower surface of the turntable 18. These pins 50 are minute slightly above the upper surface of the base 10 so as to successively be positioned in front of the clamping assembly for engagement thereby. The air cylinder 31 is aligned so that when the piston rod 33 is extended, the clamping assembly engages one of the pins 50 so as to receive the pin through opening 43 into the recess 42 and, upon the further travel of piston rod 33, the clamping assembly will carry the pin 50 in its arcuate path through approximately 90°. In so doing, the clamping assembly pivots in a counterclockwise direction and then pivots to its normal position as shown in broken lines in FIG. 3. As the piston 33 is returned from the extended position shown by broken lines in FIG. 3, the lever 36 strikes a subsequent pin 50 and is urged in a counterclockwise direction whereby the clamping assembly may clear this pin and be again positioned so as to engage this pin 50.

It will be observed in FIG. 3 that a guide bar 51 extends outwardly from the plate 34 and is slidable retained by an upstanding bracket 52 mounted on base 10. The outer end of slide bar 51 is provided with a pair of spaced upstanding pins 53, 53' which are aligned along the axis of bar 51. An upstanding stub shaft 54 is mounted on bar 51 and carries a horizontally disposed straight bar lever 55, one arm of which projects between the pins 53, 53'. The other arm of lever 55 is provided with an elongated slot 56, within which is carried a follower 57. The follower 57 is mounted on the inner end of a slide bar 58 retained for slidable movement against the surface of base 10 by guides 58'. As shown in FIG. 3, when the piston rod 33 is urged to its extended position, the slide bar 58 is urged inwardly by lever 55 and when the piston rod 33 is returned to its normal position, as shown by solid lines in FIG. 3, the bar 58 is returned outwardly. At the outer end of slide bar 58 there is provided an upstanding arm 59, the upper end of which is provided with a long transverse brush 60 having upstanding bristles 61.

Referring now to FIGS. 1 and 2, it will be seen that, on the upper surface of the turntable 18, there is provided a plurality of pairs of brackets 70, 70', 71, 71', the pair of brackets 70, 70' respectively retaining slidable upstanding sizing blocks, such as blocks 72 and the brackets 71, 71' retaining slidable tension blocks, such as blocks 73. The blocks 72 and 73 are so arranged that each block 72 is opposed by a block 73 and a pair of such blocks 72 and 73 is arranged each 90° radially on the turntable 18 so that extending inwardly from the block 73 are eye-bolts 74 which are respectively pivotally connected to the ends of links 75. The other ends of the links 75, in turn, are pivotally connected to the upper surface of the adjustment ring 76 which is slidably carried by hold-down fingers 77 and a set screw 78. The fingers 77 and set screw 78 are radially spaced apart so as to position the ring 76 concentrically with respect to pivot pin 17. Thus, by loosening set screw 78, the ring 76 may be rotated so as to move the blocks 72 simultaneously along their brackets 70, 70'. When the set screw 78 is tightened, however, the blocks 72 are fixed in position and will not be moved until the ring 76 is readjusted. A suitable scale such as scale 80 on the turntable 18 may be provided so that a scribe mark 81 on ring 76 may be positioned with respect to the scale 80 to indicate the position of the blocks 72 along the brackets 70, 70'.

Referring now to other blocks 73, each such block is provided with a hollow bore 82 which passes from one end of the block 73 inwardly, as seen in FIG. 4. A coil spring 83 is provided within bore 82 and acts against one end of a plunger 84, the other end of which is provided with external threads 85 received within an appropriate aperture in a brace 86 mounted on turntable 18. Thus, each of blocks 73 is urged away from its brace 86 by spring 83.

At the opposite end of each block 73 there is provided a bellcrank 87 pivotally mounted on the turntable 15 by a pivot pin 88 carried by brackets 89. Each bellcrank 87 includes an upstanding arm adjacent to the end of each block 73, the upstanding arm being provided with a screw 90 having a rounded head which acts against the end of the block 73. The other arm of the bell crank extends outwardly about horizontal to the turntable 15 and acts against the head 91 of a slidable pin 92 carried within an appropriate aperture through turntable 18. The pin 92 projects below the surface of the turntable 15 and terminates in a bearing surface 93 adapted to ride along the surface of a circular rail 94 mounted on upstanding brackets 95 on base 10.

As best seen in FIGS. 2 and 3, the arcuate or circular rail 94 is provided with downwardly turned ends 96 so that the pins 92 are gradually urged upwardly as the pin 92 approaches the discharge position at the left in FIG. 1, and remains up as the particular cuff carrying member is indexed 90° to the cuff receiving or loading position. As the turntable 15 is indexed further, so that the cuff carrying member approaches the sprinkling position at the left in FIG. 1, the pin 92 of the particular cuff carrying member is carried by the turntable off of the rail 94 and the block 73 is therefore urged to the position shown in FIG. 4, until it again approaches the cuff discharge position.

For carrying the cuffs, I have provided a pair of outwardly extending opposed spaced cuff receiving plates 100, 101 for each cuff carrying member. These plates 100, 101 lie in a horizontal plane above the turntable 18 and project outwardly beyond the edges thereof. The plates 100, 101 are respectively secured along the upper surfaces of blocks 72 and the plates 100 are respectively secured along the upper surfaces of blocks 73, 100, 101 is a thin flat member having straight front edges 102, 103, respectively, and straight outer side edges 104, 105, respectively, the side edges extending about parallel to each other on opposite sides of a radial line in each cuff carrying member. The front edges 102 and 103 are about aligned with each other in each side edge 104, 105 thereof.
As best seen in FIG. 1, the plates 160, 101 are provided respectively with opposed spacing fingers 166, 107 which extend from the inner side edges toward each other to limit the movement of the plates 160, 101 toward each other. At the rear of the machine adjacent edge 14 is the presser which includes a platform 110 mounted on the base 10. Extending upwardly above turntable 18 from platform 110 is a standard 111 which is provided with a forwardly facing plate 112. Mounted on the plate 112 and extending over the path of travel of the cuff receiving plates 109, 101 is a cylinder supporting bracket 113 on which is mounted a hydraulic cylinder 114 provided with a piston 115 seen in FIG. 7 and a piston rod 116 actuated by the two conduits 123 and 124. Communicating with the conduits 123 and 124 respectively are branch conduits 125 and 126 which lead through cut-off valves 127 and 128 to opposite ends of cylinder 31. The conduits 123 and 124 lead to opposite ends of cylinder 114 for the actuation of piston 115.

The master control valve 122 is a spring loaded member so that when no pressure is applied to actuate the valve connects the line 121 to line 124 such that piston rod 33 is protracted by piston 22 and piston rod 116 is retracted by piston 115. If, however, hydraulic pressure is applied to the valve 122 by fluid led into the valve from pilot tube 150, the valve will be shifted so that the hydraulic fluid under pressure will be directed through conduits 123 and 125 to cause piston 32 to retract piston rod 33 and piston 115 to protract piston rod 116.

It will, of course, be understood that when the valve 122 is in a position to conduct fluid from line 121 to conduit 124, return fluid from conduit 123 directed to return line 129 and conversely when the valve 123 is shifted, the valve connects conduit 124 with the piston 115. Upon actuation of the piston 115, the piston rod 116 will be moved upwardly or downwardly in a vertical axial path. At the lower end of the piston rod 116 is a wide rectangular presser plate 117 having embedded therein electrical heating elements 118. The lower surface of the presser plate 117 is flat and smooth.

Supported from base 10 vertically below the presser plate 117 is a platen 119 which has a smooth flat upper surface slightly below the plane of travel of the cuff carrying plates 109, 101. The platen 119 is also rectangular and is essentially the same size as and is vertically aligned with presser plate 117. Thus, upon downward movement of the piston rod 116, the lower surface of the presser plate 117 will be brought into registry with the upper surface of the platen 119, sandwiching therebetween the cuff carrying plates 109, 101.

Referring now to FIG. 7, hydraulic fluid under pressure for operating the mechanism heretofore described is supplied from a source of supply (not shown) through the main hydraulic supply line 129, via line 121, to a master control valve 122 which selectively directs the fluid return line 129.

For actuating the valve 122, there is provided a time delay pivot valve 130 connected to main line 109 by a conduit 131 and to a return line 132. When the pivot valve 130 is actuated, hydraulic fluid is supplied via conduit 133 to the master valve 122. When the pivot valve 130 is unactuated, the conduit 132 is open to the return line 132 and hence the valve 122 will be returned under the influence of a spring to its original position.

For controlling an electric timer 135 on pilot valve 130 there is a timer control tube 140, in which are arranged the limit valves 141 and 142 in series with each other. The timer control tube 140 is connected between the main line 130 and the timer 135 and electric wires 136, 137 supply current through switch 138 thereto. The limit valves 141 and 142 are normally opened such that fluid is supplied to actuate a timer 135.

As seen in FIGS. 1 and 2, the limit valves 141 and 142 are carried by a brace 144 extending up from the base 10 so that the presser plate 117 engages the lever of valve 141 when it is completely closed against the platen 119 and engages the lever of valve 142 when the presser plate 117 is completely retracted from the platen 119.

Operation

From the foregoing description, the operation of the present machine should be apparent. The operator sits at a position adjacent the front 11 of the base 10. The hydraulic supply is opened to supply fluid to line 120. The operator then installs the cuff which he has inverted on the end of the plates 109, 101 each time a new cuff receiving member is positioned in front of him. To start the cycle, the switch 133 is then closed to start the timer 135, provided the presser plate 117 is completely up or completely down whereby either valve 141 or 142 is closed. The timer 135 cyclically opens and closes the pilot valve 130 whereby hydraulic fluid through conduit 133 is intermittently supplied to main hydraulic control valve 122 to slowly cycle valve 122 from one position to the other. With the valve 122 in one position, piston rod 33 is protracted and piston rod 116 is retracted. With the valve 122 in the other position, the piston rod 33 is retracted as the piston rod 116 is protracted.

With each cycle, it will be understood that the turntable 18 is rotated 90° by piston rod 33 in a clockwise direction. Also, the presser plate 117 is withdrawn as the rotation of the turntable by the piston rod 33 takes place. This action, of course, successively positions the cuffs on the plates 109, 101 at the springing position adjacent edge 12, next at the pressing position adjacent edge 14 and finally at the discharge position adjacent edge 13.

The indexing of the turntable 18 causes the pin 92 connected to the cuff carrying assembly to ride off of the rail 94 as the particular plates 108, 101 approach the springing position. This stretches the cuff by permitting movement, under the force of spring 83 of the plate 101 outwardly of the plate 108. The plate 101 remains in that position until the particular cuff carrying member approaches the discharge position.

It will be understood that after the turntable 18 has been indexed 90°, the timer 135, acting through the pilot valve 130, causes shifting of main valve 122 so that the hydraulic fluid admitted to conduit 133 causes, on the second part of each cycle, the withdrawal of piston rod 33 as the presser plate 117 presses down against a cuff held in a stretched condition by plates 108, 101 immediately above platen 119 to press the cuff.

With subsequent cycling, the cuffs are successively arranged at the discharge position. As each cuff approaches the discharge position, the pin 92 again rides on the rail 94 thereby the plate 101 is moved toward the plate 100 so that the cuff is loosely held by the plates 100, 101. The protracting of piston rod 33, during the indexing position of the cycle, causes withdrawal of arm 59 and therefore the brush 60 to the position shown by broken lines in FIG. 3 and, in the pressing portion of the cycle, the piston rod 33 is retracted to thereby protract the brush 60 to its position shown in FIG. 2. Thus, each cuff is discharged as the piston rod 33 is withdrawn.

It will be obvious to those skilled in the art that many variations may be made in the embodiment chosen for the purpose of illustrating the present invention without departing from the scope thereof as defined by the appended claims.

I claim:

1. A cuff pressing machine wherein successive cuffs are pressed comprising a turntable rotatable about an axis, means for indexing said turntable through a predetermined arc in a prescribed direction upon each actuation of said means for indexing said turntable, a plurality of cuff carrying members extending radially from said turntable, said cuff carrying members being evenly spaced circumferentially from each other by a distance equal to said predetermined arc, said cuff carrying members being adapted
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A cuff pressuring machine wherein successive cuffs are pressed comprising a turntable rotatable about a vertical axis, means for indexing said turntable through a predetermined arc in a prescribed direction upon each actuation of said means for indexing said turntable, a plurality of cuff carrying members extending radially from said turntable, said cuff carrying members being evenly spaced circumferentially from each other by a distance equal to said predetermined arc, said cuff carrying members being adapted to receive and removably retain cuffs thereon, pressing means arranged in a radially fixed position adjacent said turntable for pressing successively cuffs carried on said cuff carrying members, a cuff discharge member arranged adjacent said turntable and radially spaced from said pressing means for engaging and discharging said cuffs successively from said cuff carrying members after said cuffs have been pressed by said pressing means, and means for actuating said means for indexing said turntable and said cuff discharge member.

A cuff pressuring machine wherein successive cuffs are pressed comprising a turntable rotatable about a vertical axis, means for indexing said turntable, a plurality of cuff carrying members extending radially from said turntable, said cuff carrying members being evenly spaced circumferentially from each other by a distance equal to said predetermined arc, said cuff carrying members being adapted to receive and removably retain cuffs thereon, pressing means arranged in a radially fixed position adjacent said turntable for pressing successively cuffs carried on said cuff carrying members, a cuff discharge member arranged adjacent said turntable and radially spaced from said pressing means for engaging and discharging said cuffs successively from said cuff carrying members after said cuffs have been pressed by said pressing means, and means for actuating said means for indexing said turntable and said cuff discharge member and said pressing means in synchronization such that said pressing means press one of said cuffs as said cuff discharge member is discharging a preceding cuff.

6. A cuff pressuring machine wherein successive cuffs are pressed comprising a turntable rotatable about a vertical axis, means for indexing said turntable through a predetermined arc in a prescribed direction upon each actuation of said means for indexing said turntable, a plurality of cuff carrying members extending radially from said turntable, said cuff carrying members being evenly spaced circumferentially from each other by a distance equal to said predetermined arc, said cuff carrying members being adapted to receive and removably retain cuffs thereon, pressing means arranged adjacent said turntable in a position to press successively cuffs carried on said cuff carrying members, a cuff discharge member arranged adjacent said turntable and radially spaced from said pressing means for discharging said cuffs successively from said cuff carrying members after said cuffs have been pressed by said pressing means, and means for actuating said means for indexing said turntable and said cuff discharge member, said discharge member including a brush movable adjacent said cuff carrying member, said brush being movable outwardly by said power means as a cuff carrying member is aligned with said brush.

7. In a cuff pressuring machine, a turntable and a plurality of cuff carrying members on said turntable, each cuff carrying member including a pair of spaced parallel movable plates, means for simultaneously moving one of said plates of each of said cuff carrying members, and means for individually moving said other of said plates in response to movement of said turntable.

8. In a cuff pressuring machine a platform, a turntable spaced above and rotatably mounted on said platform, a curved track mounted on said platform between said platform and said turntable, a plurality of cuff carrying members on said turntable and evenly spaced circumferentially from each other, each of said cuff carrying members including a pair of flat plates spaced from each other, one of said plates being relatively fixed with respect to said platform, the other of said plates being slidable toward and away from said one of said plates, and control means for moving said other of said plates engageable with said track as said turntable is rotated.

9. In a cuff pressuring machine a platform, a turntable spaced above and rotatably mounted on said platform, a curved track mounted on said platform between said platform and said turntable, a plurality of cuff carrying members on said turntable and evenly spaced circumferentially from each other, each of said cuff carrying members including a pair of flat plates spaced from each other, one of said plates being relatively fixed with respect to said platform, the other of said plates being slidable toward and away from said one of said plates, spring means for urging said other of said plates away from said one of said plates, a pin movably carried by said turntable and engageable with said track as said turntable is rotated, and means interconnecting said pin and said other of said plates for moving said other of said plates toward...
said one of said plates when said pin is engaging said track.

10. In a cuff pressing machine a platform, pressing means on said platform, a turntable spaced above and rotatably mounted on said platform, means for rotating said platform, a curved track mounted on said platform between said platform and said turntable, a plurality of cuff carrying members on said turntable evenly spaced circumferentially from each other and movable by said turntable successively into registry with said pressing means, each of said cuff carrying members including a pair of flat plates spaced from each other, one of said plates being relatively fixed with respect to said platform, the other of said plates being slidably toward and away from said one of said plates, means for urging said other of said plates away from said one of said plates, a pin movably carried by said turntable and engageable with said track as said turntable is rotated, and means interconnecting said pin and said other of said plates for moving said other of said plates toward said one of said plates when said pin is engaging said track, said pin being engageable with said track when its cuff carrying member is out of registry with said pressing means.

11. In a cuff pressing machine a platform, a turntable spaced above and rotatably mounted on said platform, a curved track mounted on said platform between said platform and said turntable, a plurality of cuff carrying members on said turntable and evenly spaced circumferentially from each other, each of said cuff carrying members including a pair of flat plates spaced from each other, means connecting one of said plates of each of said cuff carrying members together for simultaneous movement with respect to said platform, the other of said plates being slidable toward and away from said one of said plates, means for urging said other of said plates away from said one of said plates, a pin movably carried by said turntable and engageable with said track as said turntable is rotated, means interconnecting said pin and said other of said plates for moving said other of said plates toward said one of said plates when said pin is engaging said track.

References Cited in the file of this patent

UNITED STATES PATENTS

1,993,640 Woodward et al. Mar. 5, 1935
2,632,966 Lefk Mar. 31, 1953
2,804,244 Hunt Aug. 27, 1957
2,917,211 Silverman Dec. 15, 1959
2,939,228 Langen June 7, 1960