Jan. 9, 1951 J. C. JOHNSON ET AL 2,537,832

APPARATUS FOR ASSEMBLY LININGS IN RECEPTACLE CLOSURE CAPS

Filed Nov. 27, 1946 4 Sheets-Sheet 1

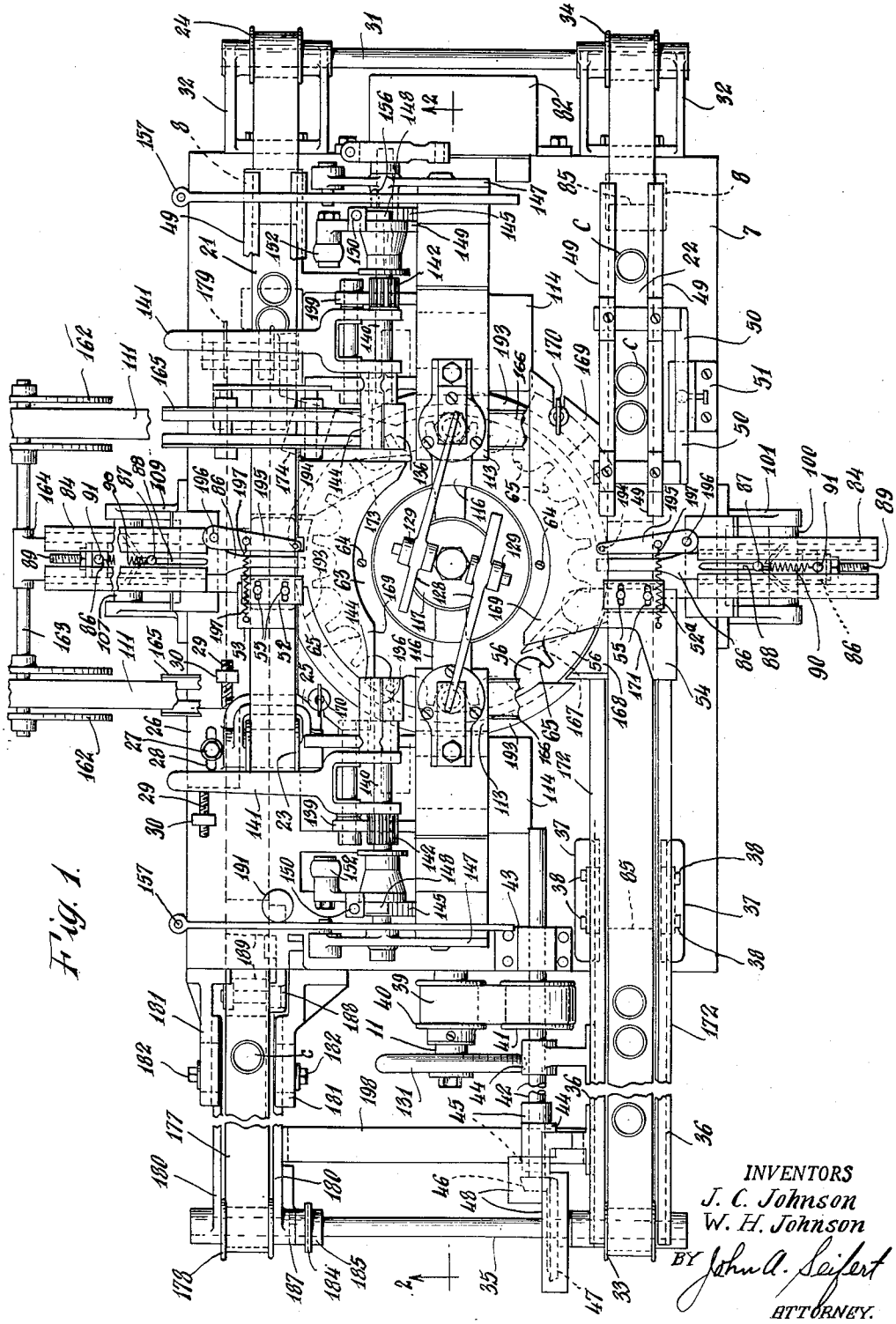


Fig. 1.

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4 Sheets-Sheet 2

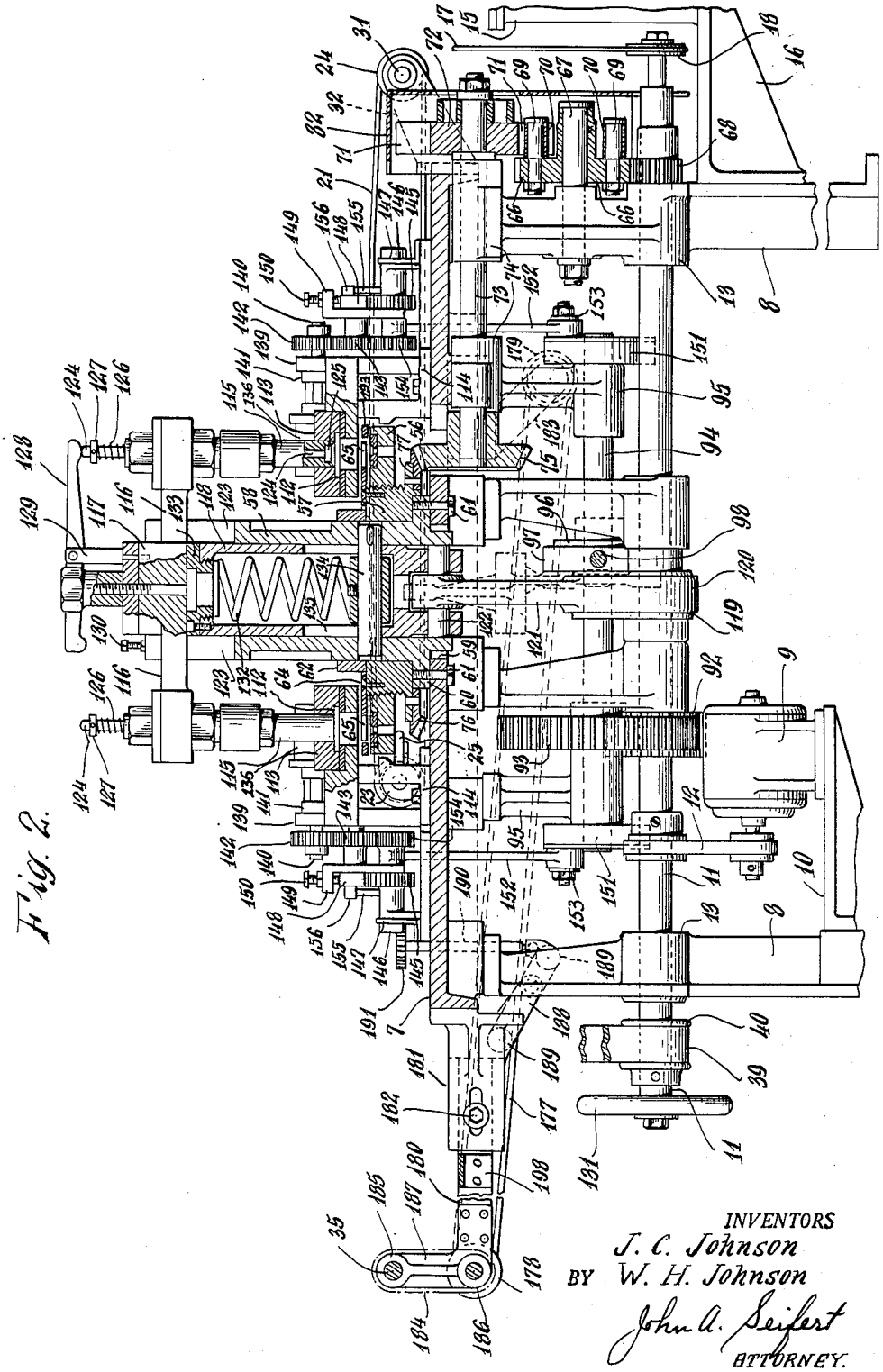


Fig. 2.

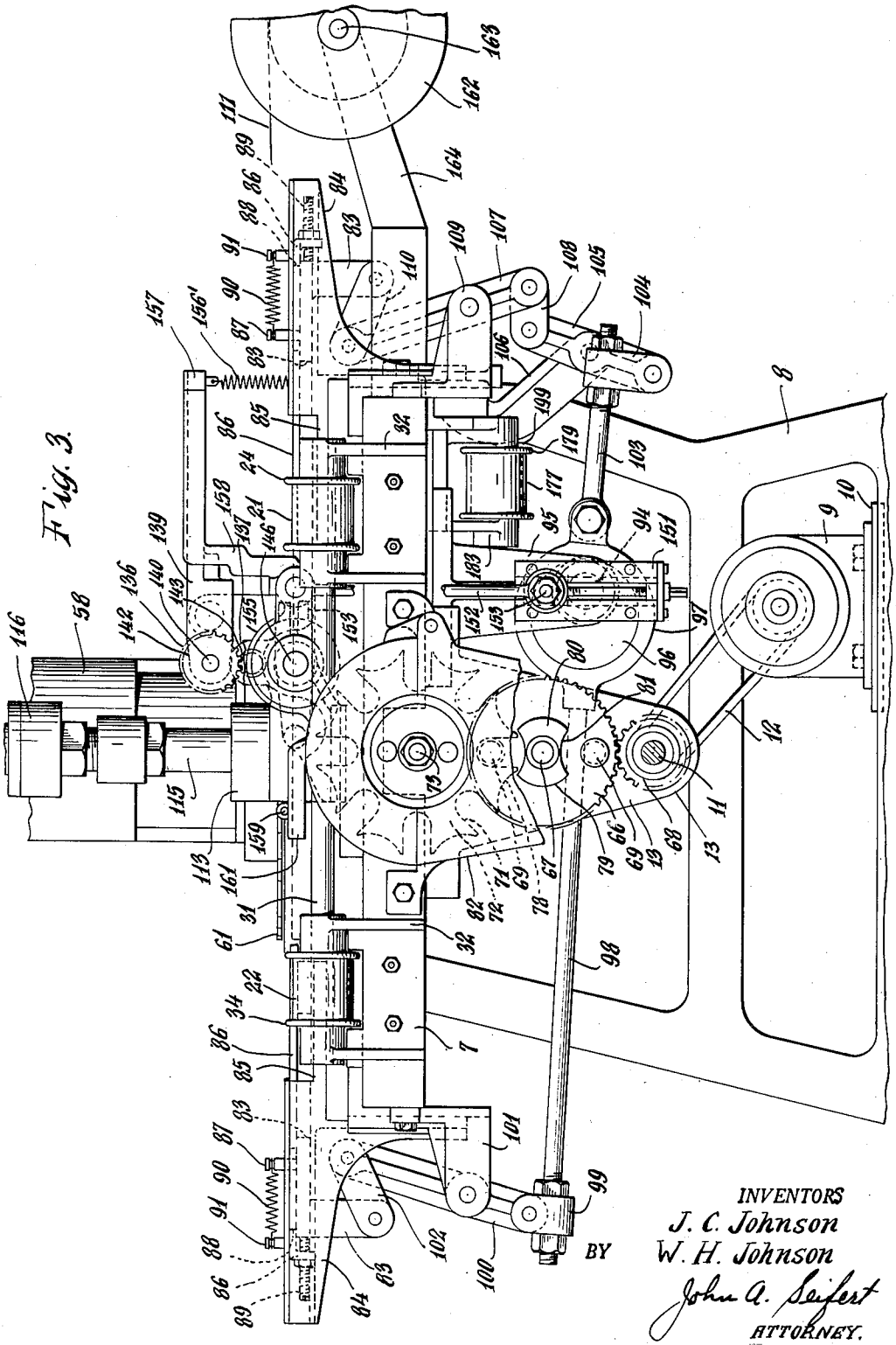
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APPARATUS FOR ASSEMBLY LININGS IN RECEPTACLE CLOSURE CAPS

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Fig. 3.



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APPARATUS FOR ASSEMBLY LININGS IN RECEPTACLE CLOSURE CAPS

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Fig. 4.

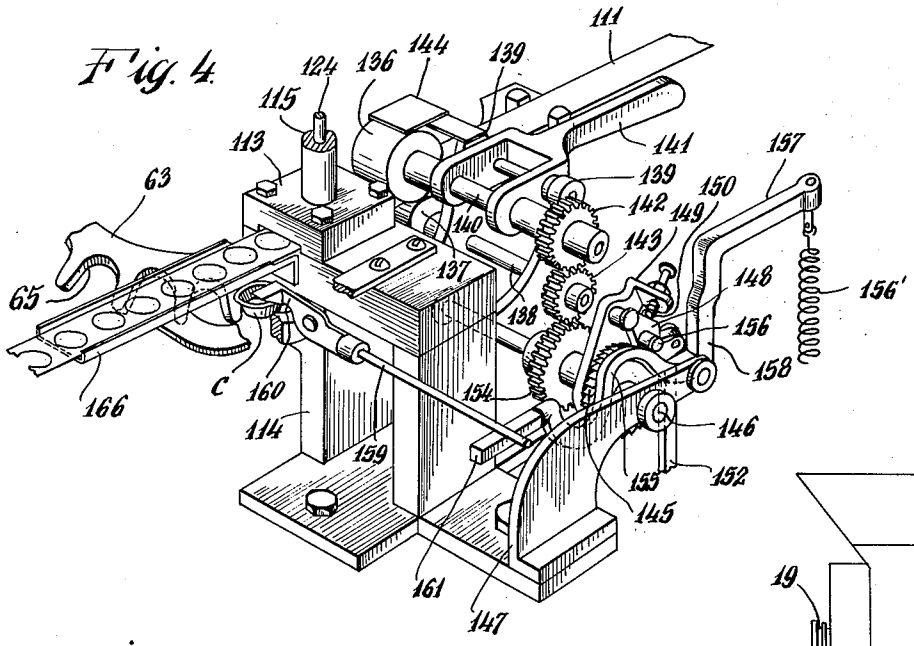


Fig. 5.

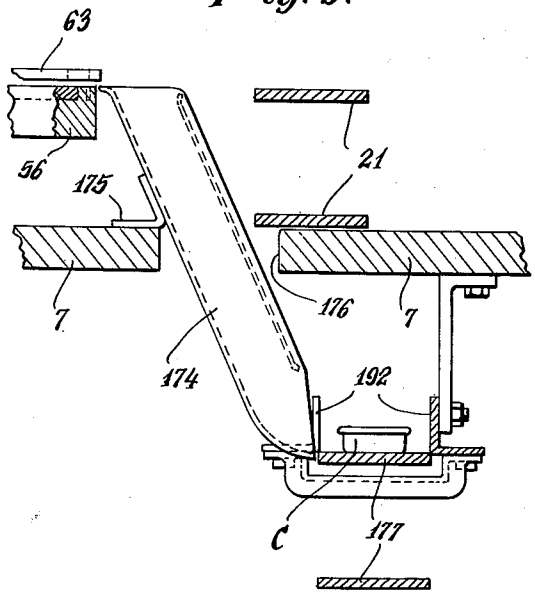
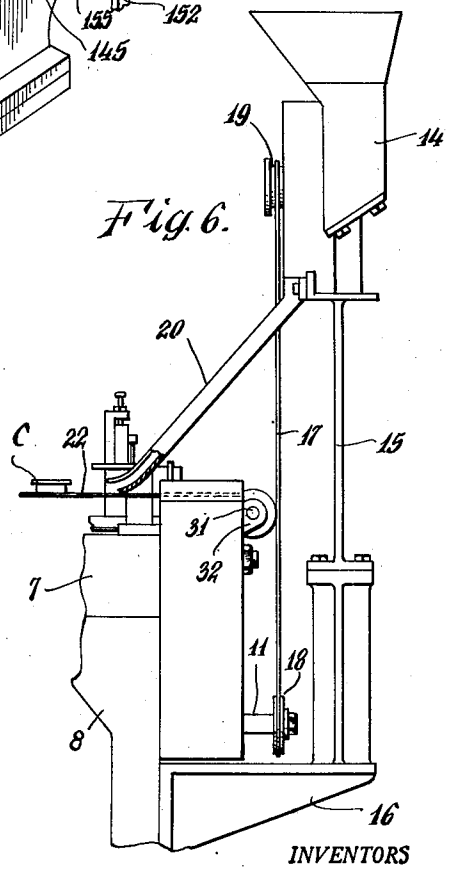


Fig. 6.



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UNITED STATES PATENT OFFICE

2,537,832

APPARATUS FOR ASSEMBLING LININGS IN RECEPTACLE CLOSURE CAPS

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Application November 27, 1946, Serial No. 712,552

13 Claims. (Cl. 113—80)

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This invention relates to apparatus for assembling linings in receptacle closure caps, the linings consisting of disks severed from a web of suitable material, such as heavy paper.

It is an object of the invention to double the production of assembled receptacle closure caps without increasing the size or cost of manufacture of the apparatus now in use for the same purpose.

It is another object of the invention to feed closure caps onto diametrically opposite portions of a rotatable closure cap support by a pair of conveyers and removing assembled closure caps from the rotatable support onto one of the pair of conveyers and onto another single conveyer to discharge the assembled closure caps from the apparatus.

It is a further object of the invention to provide an apparatus wherein the travel of the closure caps from the point of delivery of closure caps onto the rotatable support to the point of discharge of assembled closure caps from said rotatable support is less than 180°.

Another object of the invention is to provide independent adjustment of a pair of endless belt conveyers and a single endless belt conveyer to vary the lengths of said conveyers.

A further object of the invention is to provide a reciprocatory head yieldingly counterbalanced against the weight thereof to prevent said head and punches carried thereby from assuming an undesired position when the apparatus is stopped.

Other objects and advantages of the invention will hereinafter appear in the detailed description thereof.

In the drawings accompanying and forming a part of this application, Figure 1 is a plan view of the apparatus forming the embodiment of the invention.

Figure 2 is a sectional view of the apparatus taken substantially on the line 2—2 of Figure 1 looking in the direction of the arrows and showing brackets for supporting receptacle closure cap hoppers not shown in Figure 1.

Figure 3 is an end elevational view looking at the right hand end of Figure 1.

Figure 4 is a perspective view of means for feeding a web of lining material to a punch and die mechanism.

Figure 5 is an elevational view of a chute for delivering assembled closure caps from the rotatable support to the single conveyer.

Figure 6 is a side elevational view of a receptacle closure cap hopper of a pair of said hoppers mounted on the bracket shown in Figure 2.

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In carrying out the invention shown in the accompanying drawings, there is provided a table 7 having legs 8 at the opposite ends, as shown in Figure 2, for supporting the operative parts of the apparatus in elevated position.

The operative parts of the apparatus are actuated from a suitable source of power shown as an electric motor 9 mounted on a platform 10 supported below the table by a transverse member of the legs 8 at one end of the table. The electric motor is operatively connected to the operative parts of the apparatus through a drive shaft 11 directly connected to the electric motor by a belt 12 and rotatably supported below the table 7 by bearings 13 suspended from the opposite ends of said table.

Closure caps C into which linings are to be assembled are supplied by a pair of hoppers shown in a general way at 14 in Figure 6 and supported by a pair of standards 15 mounted on a bracket 16 fixed to the legs 8 at the end of the table opposite the end supporting the motor 9. As usual the hoppers have agitators, not shown, actuated from the drive shaft 11 through a belt 17 engaged around a pulley 18 on a projecting end portion of the drive shaft and pulleys 19 fixed on the shafts of the agitators. The closure caps are discharged from the hoppers 14 through a pair of chutes 20 communicating at one end with the hoppers to receive closure caps therefrom and the opposite end discharging closure caps onto the upper stretches of a pair of endless belt conveyers 21, 22, as shown in Figure 6, to be delivered to assembling means to be hereinafter described.

The endless belt conveyor 21 is supported between drums 23 and 24, drum 23 being rotatably supported between the legs of a U-shaped bracket 25 having one leg portion supported by a base 26 slidably mounted on the top of table 7 by a bolt 27 screw threaded in the table and engaged in a slot 28 in the base of the bracket, whereby the length of the endless belt conveyer 21 is varied by loosening the bolt 27 and adjusting the base 26 on the table 7 through adjustment of screws 29 in ears 30 projecting from the top of the table 7 to position the screws to abut opposite ends of the base of the bracket, as shown in Figure 1. The other drum 24 is fixed on one end portion of a shaft 31 rotatably mounted at the opposite end portions in bifurcated brackets 32 fixed to the end of the table on which the hoppers 14 are

mounted, the drum 24 being between the bifurcation legs of one of said brackets.

The other endless belt conveyer 22 is supported between drums 33 and 34, the drum 34 being fixed on the end portion of the shaft 31 opposite to the end portion supporting the drum 24 and between the bifurcation legs of the other bracket 32. The drum 33 is fixed on one end portion of a shaft 35 rotatably mounted at said end portion in the end portions of a pair of arms 36 extending on opposite sides of the endless belt conveyor 22 and having the opposite end portions slidably mounted in brackets 37 fixed on top of the table 7 to permit adjustment of the drum 33 toward and away from the adjacent end of the table to vary the length of the endless belt conveyer 22. The arms 36 are retained in adjusted position by set screws 38, as shown in dotted lines in Figure 1.

The endless belt conveyers 21 and 22 are continuously actuated from the drive shaft 11 through a belt 39 engaged around a pulley 40 fixed on the drive shaft and a pulley 41 fixed on a shaft 42 having one end portion slidably and rotatably mounted in a bearing 43 fixed on top of the table 7. The opposite end portion of the shaft 42 is rotatable in bearings 44 mounted on one of the adjustable arms 36 and retained against longitudinal movement in said bearings 44 by collars 45 secured on said shaft on opposite sides of one of the bearings 44, so that the adjustment of the arms 36 in the brackets 37 will move the shaft 42 therewith and the shaft sliding in the bearing 43. The end portion of the shaft 42 projecting from one of the collars 45 is operatively connected to the drum 33 of the endless belt conveyer 22 through a beveled pinion 46 fixed on said projecting end of the shaft 42 and meshing with a beveled gear 47 fixed on the portion of the shaft 35 extending from the inner arm 36, as shown in Figure 1. The pinion 46 and gear 47 are enclosed in a housing 48 carried by the adjacent arm 36 and bearing 44.

The closure caps C are retained on the upper stretches of the endless belt conveyers 21 and 22 from the discharge ends of the chutes 20 to an intermediate portion of said conveyers by guide rails 49 adjustably supported on the opposite sides of the conveyers by right angular members 50 adjustably mounted in a bracket 51 fixed to the top of the table 7.

The travel of the closure caps on the upper stretches of the endless belt conveyers 21 and 22 is stopped by abutment plates 52, 52a adjustably mounted on plates 53, 54 supported on top of the table 7 to extend in spaced parallel relation to said table top and over the upper stretches of the conveyers. The abutment plates 52, 52a are adjustably mounted on the plates 53, 54 by screws mounted in the plates 53, 54 and engaged in slots in the abutment plates 52, 52a, as shown at 55 in Figure 1.

The closure caps C engaged by the abutment plates 52, 52a are transferred from the conveyers 21 and 22 onto a rotatable support comprising an annular member 56 screw threaded on a hub member 57 rotatably supported on a cylindrical standard 58 supported in an opening 59 in the center of the table 7 by an annular flange 60 of the standard 58 resting on the top of the table 7 and secured thereto by bolts 61, as shown in Figure 2. The flange 60 also rotatably supports the hub member 57 and the hub member is retained on the flange 60 by a ring 62 engaged on the cylindrical standard 58. The screw threaded connection between the annular member 56 and the hub member 57 permits adjustment of the annular member for closure caps of different heights. The annular member 56 is arranged with pockets for the engagement of closure caps therein to retain the closure caps in equidistantly spaced relation on the annular member 56. Said pockets are formed by a series of arcuate segments 63 of a number to form a circle mounted on the upper end of the hub member 57 by screws 64. The segments 63 are arranged with a series of arcuate recesses 65 corresponding to the curvature of the closure caps and equidistantly spaced around the periphery of the segments, as shown in Figure 1. Diametrically opposite portions of the rotatable support 56 will travel relative to the upper stretches of the conveyers 21 and 22 to receive closure caps from said conveyers.

The rotatable support is intermittently actuated to successively position the recesses or pockets 65 relative to the conveyers 21 and 22 to receive successive closure caps from said conveyers. The rotatable support is actuated from the drive shaft 11 through Geneva mechanism comprising a gear wheel 66 rotatably mounted on a stud shaft 67 fixed in one of the hanger bearings 13 and said gear wheel meshing with a pinion 68 fixed on the drive shaft 11. Two pins 69 are fixed in and project from a face of the gear wheel 6 in diametrically opposed relation with rollers 70 rotatably retained on the pins by heads of the pins. The continuous rotation of the gear wheel 66 engages the pins and rollers in successive recesses 71 equidistantly spaced around and radially extending inwardly from the periphery of a disk 72 fixed on one end of a shaft 73 rotatably mounted in bearings 74 on the underface of the table 7, as shown in Figures 2 and 3. The opposite end of the shaft 73 is operatively connected to the rotatable support 56 by a beveled pinion 75 meshing with a beveled annular gear 76 fixed to a laterally extending flange 77 of the hub member 57, as shown in Figure 2. To hold the disk 72 against rotation during the periods of rest thereof concave faces 78 on the periphery of said disk between the recesses 71 are successively engaged by corresponding convex faces 79 at the opposite ends of a member 80 fixed to the face of the gear wheel 66 arranged with the pins 69 and rollers 70 and said member 80 having concave sides 81 to permit movement of the disk 72 when the pin 69 and rollers 70 are engaged in one of the recesses 71, as shown in Figure 3. The Geneva mechanism is enclosed in a protective shield 82 supported by the table 7, as shown in Figure 3.

During the periods of rest of the rotatable support 56 diametrically opposite pockets 65 are positioned in alinement with the closure caps engaged by the abutment plates 52, 52a, as shown in Figure 1, to simultaneously receive said closure caps from the conveyers 21 and 22. Said closure caps are simultaneously transferred from the conveyers 21 and 22 into the alined pockets 65 by like means so that a description of one will be sufficient to understand the structure and operation of both. Said closure cap transferring means comprises a carrier block 83 slidably mounted in a slideway 84 slidably supported by the table 7 to have adjustment in a vertical plane and having a platform portion 85 extending under the upper stretches of the conveyers 21 and 22 to support the greater portions of said upper stretches and maintaining the closure

caps in horizontal alinement with the rotatable support 54 to facilitate the transferring operation. The plates 53 and 54 are supported by the slideways 84 and participate in the vertical adjustments thereof. The closure caps are engaged by a plate 86 slidably supported by the slideway 84 above the carrier block 83 and operatively connected to said carrier block by a pin 87 fixed in the carrier block and engaging in a slot 88 in the plate 86 to impart movement of the block to the plate in a direction toward the conveyers 21 and 22 and the rotatable support 56, and by a set screw 89 adjustably mounted in a depending portion of the plate 86 to abut the block 83 and impart retrograde movement of the block from the conveyers 21 and 22 and the rotatable support 56 to the plate 86. The set screw 89 is yieldingly maintained in engagement with the block by a spring 90 fixed at one end to the pin 87 and at the opposite end to a pin 91 fixed in and projecting from the plate 86, as shown in Figures 1 and 3. Reciprocation is imparted to the carrier blocks 83 from the drive shaft 11 through a gear 92 fixed on the drive shaft and meshing with a gear 93 fixed on a shaft 94 rotatably supported in bearings 95 suspended from the table 7, as shown in Figure 2. Rotation of the shaft 94 is converted into reciprocation of the carrier blocks 83 by an eccentric 96 fixed on the shaft 94 and encircled by a strap 97 connected to one of the carrier blocks by a rod 98 secured at one end to the strap 97 and adjustably connected at the opposite end to a collar 99 pivotally connected to one end of a lever 100 pivotally supported in a bracket 101 mounted on the table 7 relative to the mounting of the slideway 84, as shown in Figures 1 and 3. The opposite end of the lever 100 is pivotally connected to the carrier block 83 by a link 102, as shown in Figure 3. The other carrier block 83 is operatively connected to the strap 97 by a rod 103 pivotally connected at one end to the strap and adjustably connected at the opposite end to a collar 104 pivoted to one end of a lever 105 pivotally supported on a bracket 106 suspended from the table 7 in alinement with the slideway 84. The opposite end of the lever 105 is pivotally connected to one end of a lever 107 by a link 108. The lever 107 is pivotally supported in a bracket 109 similar to the bracket 101 and the opposite end of the lever 107 is pivotally connected to the slide block 83 through a link 110, as shown in Figure 3. By the lever connections 105—110, the carrier block connected to the eccentric 96 by the rod 103 will be reciprocated toward and away from the rotatable support 56 in synchronism with the carrier block connected to the eccentric by the rod 98. To prevent the closure caps on the conveyers 21 and 22 engaged by the abutment plates 52 and 52a from moving onto the rotatable support 56 during the retrograde movements of the slide plates 86 and causing jamming of the segments 63, said caps are engaged by a pin 194 fixed in and extending from the underface of an end portion of an arm 195 pivotally mounted at the opposite end portion on the slideways 84, as shown at 196 in Figure 1, and said pins 194 are yieldingly positioned in the path of travel of the slide plates 86 by a spring 197 fixed at the opposite ends to an intermediate portion of the arms 195 and the plates 53 and 54. The transferring movement of the closure caps by the slide plates 86 will move the arms 195 on their pivots 196 against the force of the springs 197 and out of the path of said closure caps, as shown in Figure 1.

The closure caps engaged in the alined pockets 65 by the slide plates 86 are intermittently conveyed by the rotatable support 56 to lining assembling means in the form of a pair of punch and die mechanisms to sever disks from a pair of webs 111 and position said severed disks into closure caps alined with said punch and die mechanisms. A pair of dies 112 having a web guide 113 are mounted in spaced relation over diametrically opposite portions of the rotatable support 56 by brackets 114 secured to the top of the table 7. A pair of punches 115 are adjustably carried by arms 116 extending from diametrically opposite portions of a head 117 releasably mounted on a cylindrical slide member 118 slidable in the cylindrical standard 58 and reciprocated from the drive shaft 11 by an eccentric disk 119 fixed on the drive shaft and encircled by a strap 120 having a crank arm 121 pivotally connected at the free end to a pin 122 mounted in the lower portion of the slide member 118, as shown in Figure 2. The standard 58 is arranged diametrically opposite recesses 123 to accommodate the sliding movements of the arms 116 and prevent rotation of the head 117 and slide member 118. The punches 115 are arranged with ejectors comprising a rod 124 having a head 125 yieldingly engaged with a shoulder formed by the bore and cutting recess of the punches, as shown in Figure 2, by a spring 126 engaged on an end portion of the rods 124 projecting from the upper ends of the punches and compressed between said upper ends of the punches and a collar 127 fixed on said projecting end portions of the rods. After the punches have severed disks from the webs 111 and before the retrograde movements of the punches, the rods 124 are actuated to move the heads 125 into the cutting recesses of the punches and remove the severed disks from the cutting edges of the punches should the severed disks or linings adhere to said cutting edges. This is accomplished by kicker mechanisms comprising rocker arms 128 pivotally mounted intermediate the ends thereof on posts 129 carried by the head 117 with one end of the arms adapted to engage the projecting ends of the rods 124 and the opposite ends adapted to engage adjustable abutments in the form of screws 130 mounted in the upper end of the standard 58, as shown in Figure 2, at the terminus of the cutting movements of the punches. The slide member 118 and the punches 115 are actuated to sever disks or linings from the webs 111 during the periods of rest of the rotatable support 56.

It has been found that when the apparatus is stopped the slide member 118 will have a tendency to assume its lowermost position under the force of the weight thereof including the head 117, arms 116 and punches 115, which will require the turning of the drive shaft 11 by a hand wheel 131 fixed to one end of the drive shaft should it be necessary to replenish the webs 111 in the web guides 113 by raising the punches 115 out of said web guides. This defect has been overcome by incorporating means in the slide member 118 to counterbalance the weight carried by said member. Said counterbalancing means comprises a spring 132 mounted within the slide member 118 and compressed between a cap member 133 mounted in the upper end of the slide member 118 and a rod 134 fixed at the opposite ends in diametrically opposed

wall portions of the standard 58 and extended transversely of the slide member 118 through diametrically opposed slots 135 in the slide member, as shown in Figure 2. The strength of the spring 132 is substantially equal to the weight of the slide member 118 and the elements carried thereby, so that said weight will not force the punches 115 into the web guides 113 when the apparatus is stopped with the punches in position out of the web guides. The rod 134 is positioned in the lower portion of the standard 58 and the lengths of the slots 135 are sufficient to permit unobstructed reciprocation of the slide member 118. The head 117 is mounted on the cap member 133 of the slide member 118.

Predetermined lengths of the webs 111 are fed to the dies 112 and web guides 113 during the intermittent actuation of the rotatable support 56 and the retrograde movements of the punches 115 by two pairs of rollers 136, 137, roller 137 being fixed on a shaft 138 rotatably mounted in arms 139 extending from the bracket 114, as shown in Figure 4, with the rollers 137 below the webs 111. The rollers 136 are fixed on a shaft 140 rotatable in the bifurcation leg portions of a bifurcated mounting member 141 pivotally mounted between the bracket arms 139. The rollers 136 and 137 are driven one from the other by meshing gears 142 and 143 fixed on the shafts 140 and 138, respectively. The rollers 136 are normally maintained in engagement with the upper surfaces of the webs 111 by the weight of said rollers and gears 142. The rollers 136 are positioned from the rollers 137 by pivoting the members 141 when it is desired to engage a new web 111 between the rollers 136 and 137. The rollers 136 and 137 are provided with scrapers 144 carried by the bracket arms 139 adjacent to the rollers to remove lint from said rollers, as shown in Figure 1. The gears are intermittently rotated from the drive shaft 11 through pawl and ratchet mechanisms, each of said mechanisms comprising a ratchet wheel 145 fixed on a shaft 146 rotatable in bracket arms 139 and an additional arm 147. The ratchet wheel is actuated by a pawl 148 pivoted on a carrier plate 149 loosely mounted on the shaft 146 and the pawl yieldingly urged into engagement with the teeth of the ratchet wheel 145 by a spring carried by the carrier plate, as shown at 150 in Figure 4. The carrier plates 149 are reciprocated to actuate the pawls 148 into and out of engagement with the teeth of the ratchet wheels 145 and intermittently rotate the ratchet wheels by a crank member 151 fixed on the opposite ends of the shaft 94 through a rod 152 pivoted at the opposite ends to the carrier plates and crank members. The throw of the rods 152 is varied by adjustably mounting the pivotal connection between the rods and crank members on the crank members, as shown at 153 in Figures 2 and 3. The intermittent rotations of the shafts 146 are transmitted to the rollers 136 and 137 by a gear 154 fixed on the shafts 146 and meshing with the gears 143. The feeding of either of the webs 111 is stopped should there be no closure cap in a pocket 65 to be positioned in alinement below either of the dies 112 by the next intermittent movement of the rotatable support 56. This is accomplished by means to position either of the pawls 148 out of engagement with the teeth of its associated ratchet wheel 145. Said means comprises a lever pivoted on the bracket arm 147 and having a sinuous portion 155 adapted to engage a pin 156 fixed in and projecting from the pawl 148. The sinuous portion 155 is normally actuated by a spring 156' attached to one end portion 157 of said lever and the table 7 to position the pawl 148 out of engagement with the teeth of the ratchet wheel 145. The end portion 157 of one of the pawl engaging levers is extended in a vertical direction, as shown at 158 in Figure 3, and then laterally over and in spaced relation to the conveyer 21 to permit unobstructed travel of the closure caps from the hopper 14 to the abutment plate 52. The sinuous portion 155 is actuated out of engagement with the pin 156 by a closure cap C in said pocket 65 by a lever 159 pivoted on the bracket 114 and having one end portion arranged with a closure cap engaging finger 160. The opposite end of the lever 159 extend over an end portion 161 of the pawl engaging lever opposite the end portion 157, whereby the lifting of the finger 160 by a closure cap lowers the end portion 161 and moves the sinuous portion 155 out of engagement with the pawl pin 156, as shown in Figure 4.

The webs 111 are supplied from rolls supported on a pair of reels 162 rotatably mounted on a shaft 163 supported from the table 7 by a bracket 164, as shown in Figures 1 and 3. The webs are guided and supported from the reels 162 to the web guides 113 by pairs of rails 165 supported by the bracket arms 139. The waste portions of the webs from which the linings have been punched are supported and guided by plates 166 having the longitudinal edges flanged upwardly and supported by the brackets 114, as shown in Figure 4. The waste portions of the webs are deposited in a suitable depository, not shown.

The closure caps being conveyed from the die and punch mechanisms by the rotatable support 56 and having linings assembled therein by the punches 115 and ejector rods 124 are removed from the rotatable support in the following manner. The assembled closure caps which originally were delivered to the rotatable support by the conveyer 21 are removed from the rotatable support onto the portion of the upper stretch of the conveyer 22 extending from plate 54 to the drum 33 by a guide plate 167 supported by the platform 85 and extended between the rotatable support 56 and segments 63 to disengage the assembled closure caps from the pockets 65 and guide the disengaged closure caps onto a plate 168 supported by the platform 85. The succeeding disengaged closure caps will move the preceding disengaged closure caps onto the plate 168 and the upper stretch of the conveyer 22. A pair of plates 169 are removably mounted on posts fixed in the table 7 and engaged in a slot in each of said plates 169 and the plates clamped to said posts by a wing nut, as shown at 170 in Figure 1. The plates 169 extend over the rotatable support 56 and segments 63 to guide the closure caps from the conveyers 21 and 22 and retain the closure caps on the rotatable support and in the pockets 65. A portion of the plate 54 and adjacent plate 169 have an edge 171 extending in superposed relation to the plates 167 and 168 to guide the disengaged closure caps onto the conveyer 22. The assembled closure caps on the conveyer 22 are transported to a suitable depository, not shown, at the drum 32 and are guided along said conveyer by rails 172 supported by the table 7 and arms 36.

The assembled closure caps which were delivered to the rotatable support 56 by the conveyer 22 are removed from the rotatable support by a

plate 173 supported by the platform 85 supporting the conveyer 21 and extended between the rotatable support 56 and the segments 63 to disengage said assembled closure caps from the pockets 65 and direct the disengaged closure caps onto a chute 174 having an inlet end adjacent to the periphery of the rotatable support 56 and supported by the table 7, as at 175 in Figure 5, to extend through an opening 176 in the table 7. The lower end of the chute constitutes the outlet thereof and from which end the assembled closure caps are discharged onto the upper stretch of an endless belt conveyer 177 supported between drums 178, 179, drum 178 being rotatably supported in bearings at the ends of arms 180 slidably supported at the opposite end portions in brackets 181 fixed to the end of the table 7 on which the arms 36 are supported. The slidable mounting of the arms 180 permits adjustment of said arms to vary the length of the conveyer 177 and said arms are retained in adjusted position by bolts screw threaded in the arms and engaged in slots in the brackets with washers engaged on the bolts between the heads thereof and the brackets, as shown at 182 in Figures 1 and 2. To provide simultaneously adjustment of the drums 33 and 178, the inner arms 36 and 180 are connected to each other by a bar 198 fixed at the opposite ends to said arms, as shown in Figure 1. The drum 179 is rotatable in a bracket 183 mounted on the bottom of the table 7. The conveyer 177 is continuously actuated from the drive shaft 11 through the shaft 35 by a sprocket chain 184 engaged around a sprocket wheel 185 fixed on the end of the shaft 35 and a sprocket wheel 186 fixed on the shaft of drum 178 on which shaft said drum is fixed. The end of the shaft 35 which carries the sprocket wheel 185 is rotatable in a vertical arm 187 fixed to the inner arm 180, as shown in Figure 2. Slack is taken up in the conveyer 177 by a lever 188 pivotally supported by the bottom of the table 7 and rollers 189 carried by the opposite end portions of the lever with one roller extending transversely below the lower stretch of the conveyer and the other roller extending transversely above said lower stretch, as shown in Figure 2. The rollers 189 are actuated toward and away from the lower stretch of the conveyer 177 by a shaft 190 screw threadedly mounted in the table 7 and having one end operatively connected to the end of the lever carrying the roller positioned below the lower stretch of the conveyer 177 and the opposite end of said shaft extending from the top of the table 7 and arranged with a manipulating wheel 191. As shown in Figure 2, the conveyer 177 travels in an inclined plane from the drum 179 to the drum 178. The closure caps are retained on the upper stretch of the conveyer 177 by guide rails 192 supported from the table 7. The conveyer 177 delivers the assembled closure caps to the same depository to which the assembled closure caps are delivered by the conveyer 22.

The closure caps are retained on the rotatable support 56 and in the recesses 65 by a pair of arcuate rails 193 supported by the top of the table 7 to extend over diametrically opposite portions of the rotatable support and in spaced relation to the open sides of the recesses. The opposed ends of the rails 193 are spaced from each other to permit the delivery of closure caps from the conveyors 21 and 22 to the rotatable support 56 and assembled caps from the rotatable support to the conveyors 22 and 177, as shown in Figure 1.

The leg 8 adjacent to the conveyor 177 is offset outwardly, as shown at 199 in Figure 3, to permit unobstructed travel of said conveyor.

Having thus described our invention, we claim:

1. In apparatus for assembling linings in receptacle closure caps, a rotatable support for said receptacle closure caps, a pair of conveyers, each conveyer mounted to travel tangentially of diametrically opposite portions of the closure cap support and transport closure caps from a source of supply and one of said conveyers being of less length than the other conveyer, means to transfer closure caps from the conveyers to said diametrically opposite portions of the rotatable closure cap support, means reciprocatory toward and away from diametrically opposite portions of the closure cap support and spaced ninety degrees from the closure cap receiving portions of the closure cap support and said reciprocatory means adapted to position linings in the closure caps carried by the rotatable support, means mounted relative to opposite portions of the closure cap support to engage and remove assembled closure caps from said opposite portions of the support, a conveyer traveling in a plane below the plane of travel of the pair of conveyers, and means to deliver assembled closure caps removed from the rotatable support by one of the closure cap removing means to said latter conveyer, and the other closure cap removing means adapted to deliver the assembled closure caps onto the conveyer of greater length of the pair of conveyers.

2. In apparatus for assembling linings in receptacle closure caps, a rotary support for said closure caps, a pair of conveyers, each conveyer traveling adjacent diametrically opposite portions of the closure cap support and having one end adapted to receive closure caps from a source of supply and the opposite end of one of the conveyers extending beyond the corresponding end of the other conveyer, means to simultaneously transfer closure caps from the pair of conveyers onto the diametrically opposite portions of the closure cap support, means arranged adjacent the path of travel of the closure caps on the support to simultaneously position linings in the closure caps transferred from the pairs of conveyers, a single conveyer traveling in a plane below the plane of travel of the pair of conveyers and having one end portion adjacent the second conveyer of the pair of conveyers and the opposite end terminating in alinement with the end of the first conveyer of the pair of conveyers extending beyond the corresponding end of the second conveyer of the pair of conveyers, and means to transfer assembled closure caps from the rotary support to the first conveyer of the pair of conveyers and to the single conveyer.

3. Apparatus for assembling linings in closure caps as claimed in claim 2, wherein the pair of conveyers travel in a horizontal plane, and the single conveyer travels in a plane inclining from the end adjacent the second conveyer of the pair of conveyers to the end in alinement with the end of the first conveyer of the pair of conveyers extending beyond the second conveyer of the pair of conveyers.

4. Apparatus for assembling linings in closure caps as claimed in claim 2, wherein the single conveyer comprises an endless belt having the upper stretch adapted to support and convey the assembled closure caps, and a lever pivotally mounted adjacent the endless belt and having a roller at the opposite ends to extend above and below the lower stretch of said belt, and an ad-

justable member connected to the lever to position the rollers into and out of engagement with the belt and take up slack therein.

5. In apparatus for assembling linings in closure caps, a table, a support for closure caps rotatably mounted on the table, a drive shaft rotatably supported below the table and operatively connected to a source of power and to the closure cap support to actuate said support, a pair of conveyers traveling relative to diametrically opposite portions of the closure cap support and operatively connected to each other and one of said conveyers operatively connected to and driven by the drive shaft, a pair of hoppers supported by the table to deliver closure caps to one end of the pair of conveyers, means supported by opposed portions of the table and operatively connected to and simultaneously actuated by the drive shaft to transfer closure caps from the conveyers to the diametrically opposite portions of the rotatable support, means supported by the table relative to the path of travel of the closure caps on the rotatable support and actuated by the drive shaft to assemble linings in said closure caps, a single conveyer traveling below the table and operatively connected to the conveyer of the pair of conveyers operatively connected to the drive shaft, and means supported by the table to remove assembled closure caps from the rotatable support to the single conveyer and to the conveyer of the pair of conveyers operatively connected to the drive shaft.

6. Apparatus for assembling linings in closure caps as claimed in claim 5, wherein the ends of the pair of conveyers receiving closure caps from the hoppers are at one end of the table, the opposite end of the conveyer operatively connected to the drive shaft extends from the opposite end of the table to discharge assembled closure caps from the apparatus, the opposite end of the other conveyer of the pair of conveyers terminates intermediate the ends of the table, one end of the single conveyer terminates intermediate the ends of the table to receive assembled closure caps from the rotatable support, and the opposite end of said single conveyer extends from the end of the table from which the conveyer of the pair of conveyers operatively connected to the drive shaft extends to discharge assembled closure caps from the apparatus.

7. Apparatus for assembling linings in closure caps as claimed in claim 5, wherein the pair of conveyers and the single conveyer are endless belts, each belt being supported between a pair of pulleys having one pulley adjustably supported by the table to provide independent adjustment of the length of each belt.

8. Apparatus for assembling closure caps, as claimed in claim 5, wherein the drive shaft is continuously rotated from the source of power, the conveyers are continuously actuated by the drive shaft, the rotatable support is intermittently actuated by the drive shaft, and the closure cap transferring means and the lining assembling means are actuated by the drive shaft to transfer closure caps from the pair of conveyers to the rotatable support and assemble the linings in the closure caps on the rotatable support during the periods of rest of the rotatable support.

9. In apparatus for assembling linings in receptacle closure caps, a rotatable support arranged with equidistantly spaced pockets to engage and support receptacle closure caps in equidistantly spaced relation, a pair of conveyers traveling relative to diametrically opposite portions of the rotatable support to transport receptacle closure caps relative to said portions, a pair of slides reciprocatory transversely of the conveyers to transfer the receptacle closure caps from the conveyers into the pockets of the rotatable support, a pair of dies mounted relative to the path of travel of the receptacle closure caps on the rotatable support and in diametrically opposed relation to each other, means to feed a web of lining material to each die, a reciprocatory head slidably mounted centrally of the rotatable support, a pair of punches carried and reciprocated by the head relative to the dies to sever linings from the webs and deposit the severed linings in receptacle closure caps positioned below the dies, a single conveyer traveling below the path of travel of the pair of conveyers, and means positioned relative to the path of travel of the assembled receptacle closure caps on the rotatable support and arranged to remove said assembled receptacle closure caps from the rotatable support to one of the pair of conveyers and to the single conveyer.

10. In apparatus for assembling linings in receptacle closure caps as claimed in claim 9, hoppers mounted adjacent one end of the pair of conveyers to deliver receptacle closure caps to said ends of the pair of conveyers, the opposite end of one of said pair of conveyers extending a greater distance from the slide reciprocatory transversely thereof than the corresponding end of the other conveyer of the pair of conveyers extends from its reciprocatory slide, and one end of the single conveyer travels adjacent the latter conveyer of the pair of conveyers and the opposite end of said single conveyer extends beyond said latter conveyer of the pair of conveyers.

11. In apparatus for assembling linings in receptacle closure caps as claimed in claim 9, a drive shaft continuously rotated from a source of power, the pair of conveyers and the single conveyer being operatively connected to each other, a shaft directly connected to the drive shaft and operatively connected to one of the conveyers to continuously actuate the conveyers.

12. In apparatus for assembling linings in receptacle closure caps as claimed in claim 9, a drive shaft continuously driven from a source of power, and an eccentric disk continuously driven from the drive shaft and operatively connected to the pair of slides to actuate the slides toward and away from the rotatable support in synchronism with each other and simultaneously transfer receptacle closure caps from the pair of conveyers to the diametrically opposite portions of the rotatable support.

13. In apparatus for assembling linings in receptacle closure caps, a rotatable support for receptacle closure caps, a pair of conveyers traveling relative to diametrically opposite portions of the rotatable support and transporting receptacle closure caps from a source of supply of said receptacle closure caps, means to transfer receptacle closure caps from the conveyers to diametrically opposite portions of the rotatable support, means arranged along the path of travel of the receptacle closure caps on the rotatable support to assemble linings in said receptacle closure caps, a single conveyer traveling in a path below the path of travel of the pair of conveyers, and means arranged along the path of travel of the assembled receptacle closure caps on the rotatable support to remove said assembled receptacle closure caps onto one of the pair of conveyers and onto the single

conveyer to be discharged from the apparatus, the lining assembling means and the assembled receptacle closure cap removing means being spaced from the receptacle closure cap transferring means and positioned relative to each other whereby the length of travel of the receptacle closure caps on the rotatable support is less than one-half of a revolution of said rotatable support.

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