

Aug. 2, 1932.

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1,869,480

APPARATUS FOR ASSEMBLING RECEPTACLE CLOSURES

Filed June 1, 1928

6 Sheets-Sheet 1

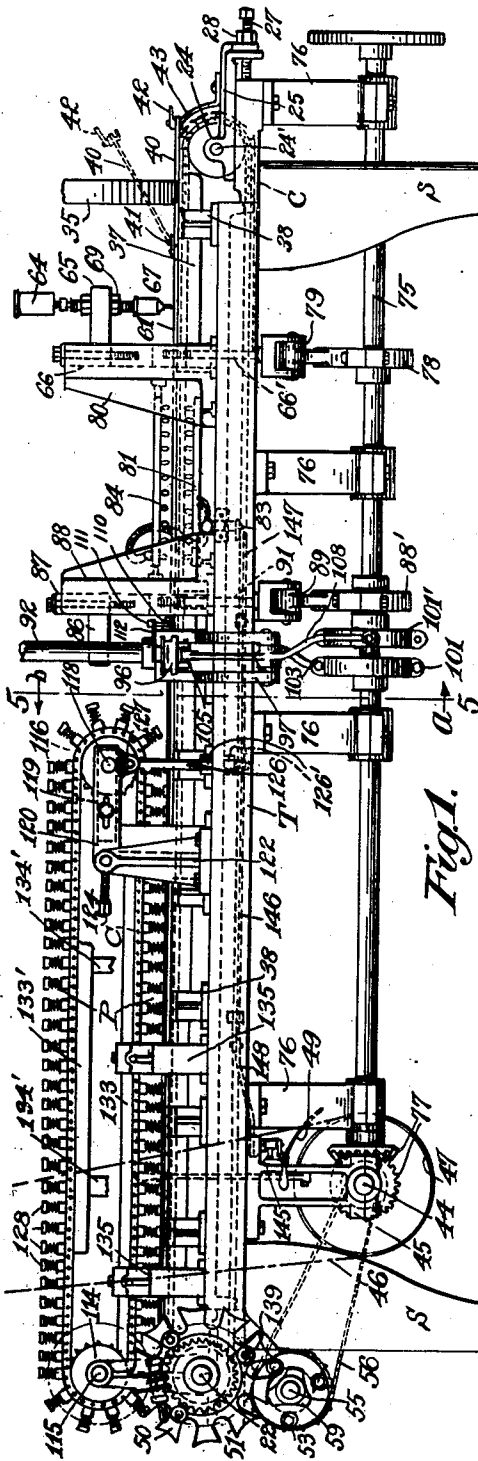


Fig. 1.

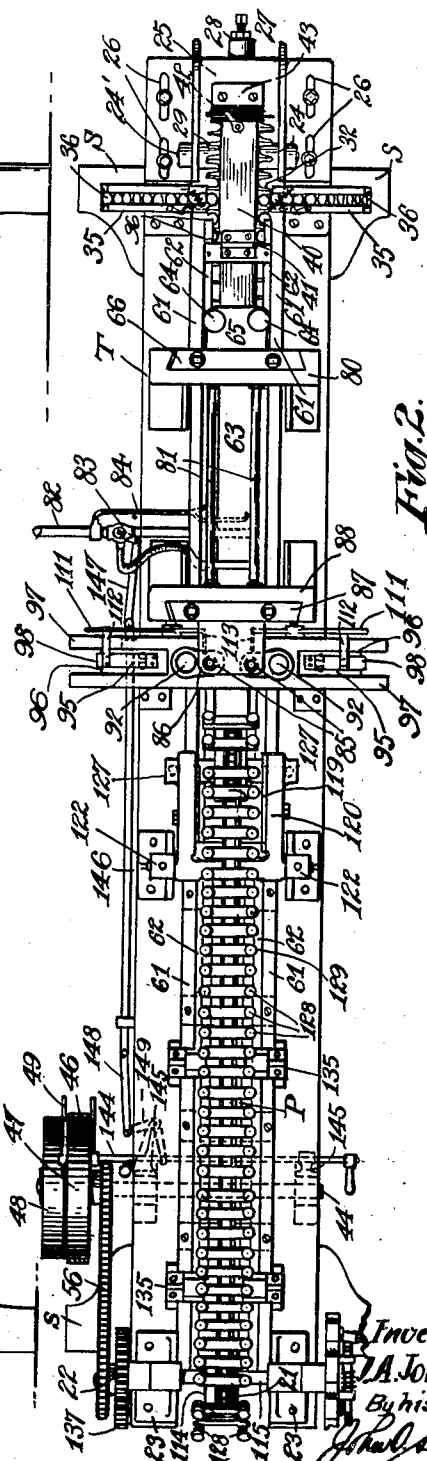


Fig. 2.

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Fig. 4.

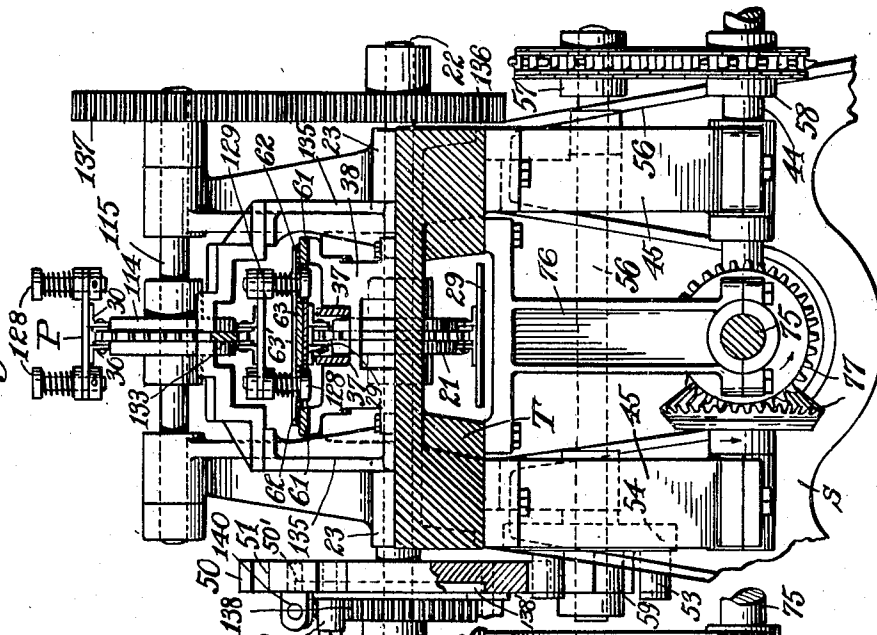
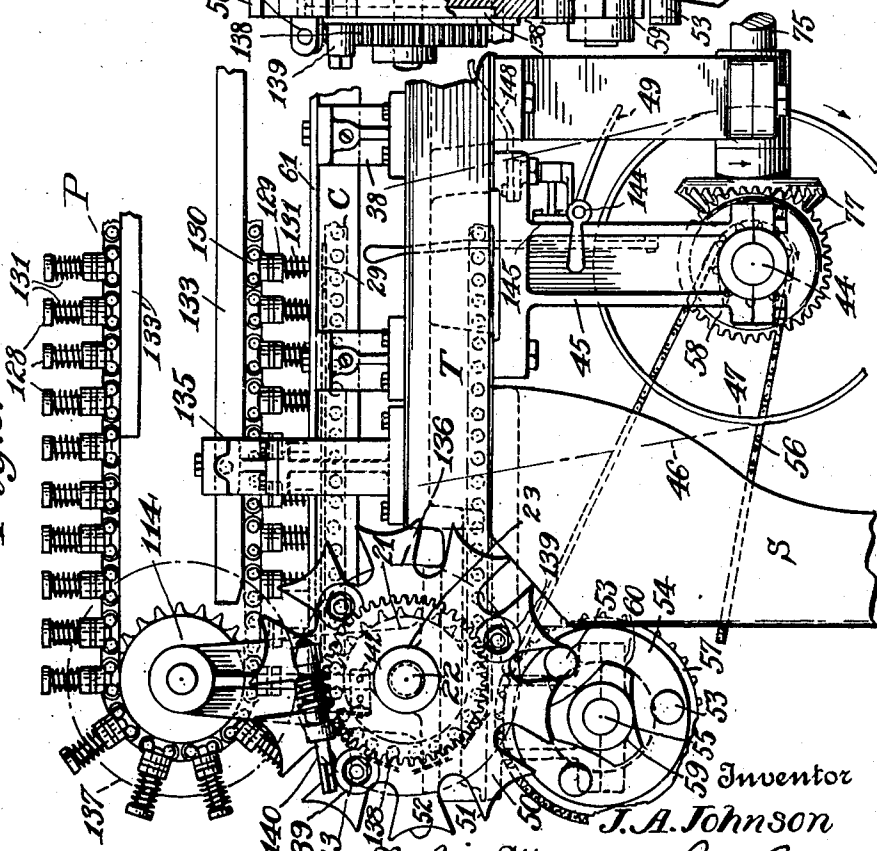


Fig. 5.



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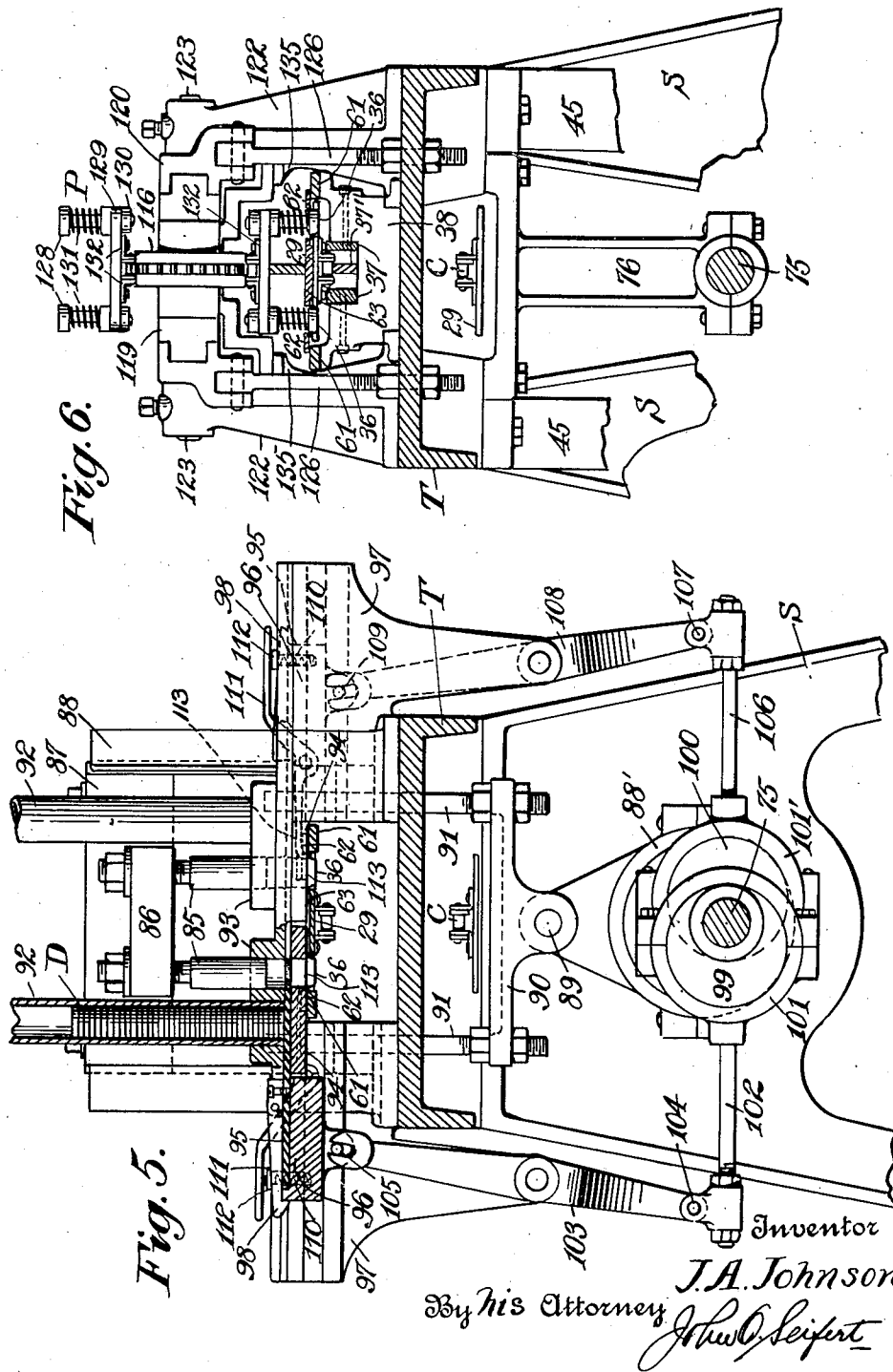
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Filed June 1, 1928

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Aug. 2, 1932.

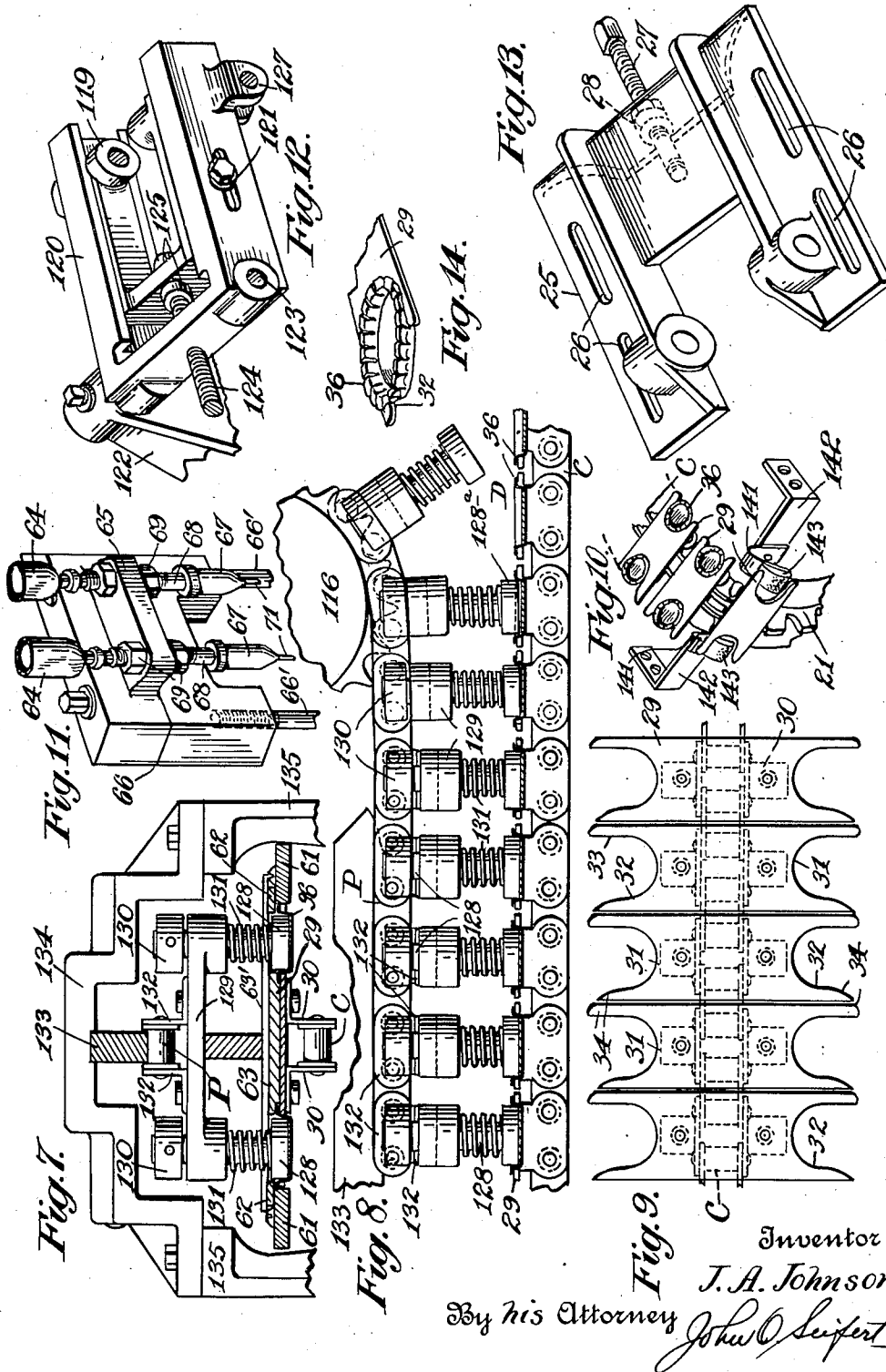
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1,869,480

APPARATUS FOR ASSEMBLING RECEPTACLE CLOSURES

Filed June 1, 1928

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Aug. 2, 1932.

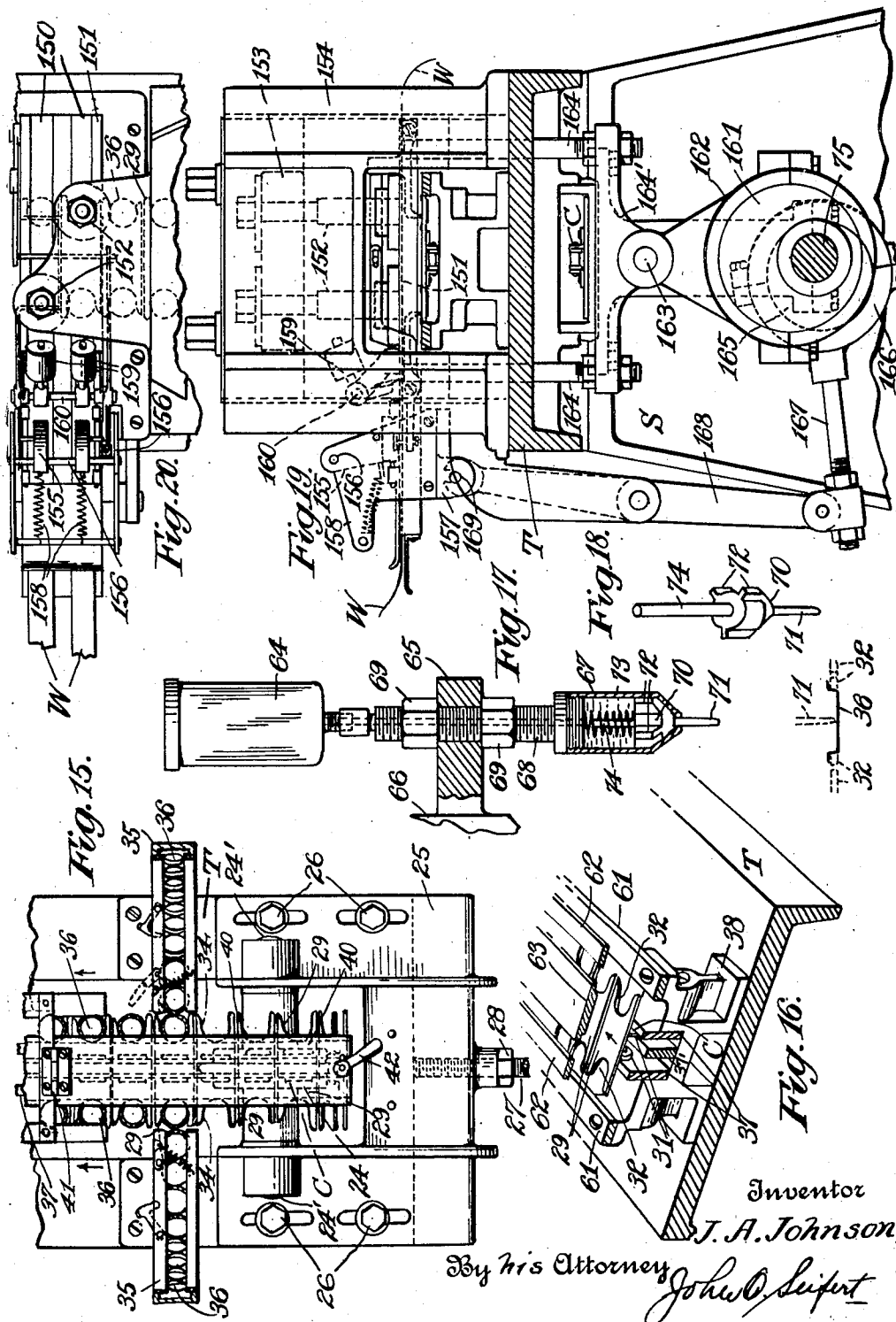
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1,869,480

APPARATUS FOR ASSEMBLING RECEPTACLE CLOSURES

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Aug. 2, 1932.

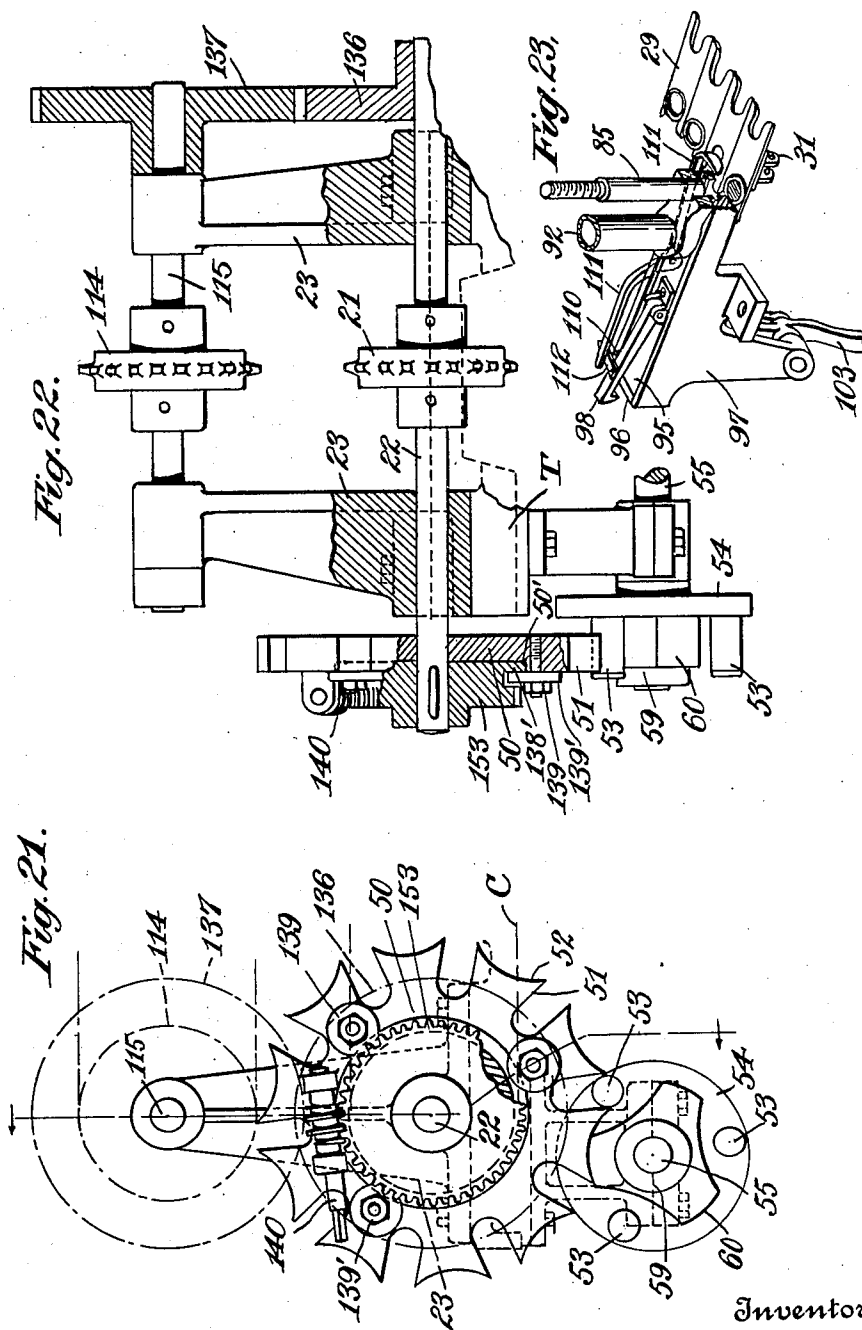
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APPARATUS FOR ASSEMBLING RECEPTACLE CLOSURES

Filed June 1, 1928

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UNITED STATES PATENT OFFICE

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APPARATUS FOR ASSEMBLING RECEPTACLE CLOSURES

Application filed June 1, 1928. Serial No. 282,260

This invention relates to apparatus for assembling receptacle closures particularly of the type arranged with corrugations or ruffles about the margin and commonly termed as "crown caps", although it is also adapted for assembling closure caps arranged with a wire edge about the margin, and consisting in the assembling and adhesively securing of a sealing disk or pad in the closure caps, either by means of an adhesive previously applied as a coating to one surface of the caps and heating the same previous to the assembling of the sealing disks therein to render the adhesive viscous, or by supplying a fluid adhesive, or a disk as of paper impregnated with an adhesive in a non-viscous state, and then heating the caps with the fluid adhesive, or the adhesive carrying disk, to render the adhesive viscous previous to the applying of the sealing disk thereto, and then placing the sealing disk under pressure in the cap during the initial period of the cooling of the heated closure caps, and it is the primary object of the invention to provide an improved constructed and arranged apparatus for this purpose to increase the production of closure caps without materially increasing the structural cost of the apparatus, and without the necessity of an increased number of attendants over what is now required in the operation of present closure cap assembling apparatus, and to provide apparatus which is novel, compact in structure and highly efficient in use.

In the present commercial type of apparatus for this purpose the closure caps during the operation of supplying an adhesive to the caps, the heating of the same to render the adhesive viscous and highly fluid, and the applying of sealing disks to the adhesive carrying caps, the caps are either slid along a support, or else they are supported at the skirt portion of the caps, and as the caps are highly decorated, due to this contact of the caps with the support, the decorative surface is frequently marred, as by scratching and cracking of such surface or otherwise with the result that they are not acceptable by the consumer.

It is a further object of the invention to

overcome this disadvantage by providing supporting means for the caps whereby when closure caps arranged with the corrugated or ruffled margin are being assembled such closure caps are supported by the corrugated portions, and when closure caps arranged with a wired edge are assembled supporting the same at the wire edge portion with the surface of the skirt and crown of the caps out of contact with the support, and support the caps in such position during the entire operation of assembling and securing of the sealing disks in the caps, and thus reduce to a minimum the possibility of scratching and marring of the decorative surface of the caps while at the same time firmly supporting the caps.

Other objects and advantages will hereinafter appear.

In carrying out the invention I provide an endless closure cap transporting conveyor arranged with plates in sequence, said plates being arranged with closure cap receiving and supporting seats to which the caps are delivered by means arranged at the sides and one end of a stretch of the conveyor to be transported for the length of such stretch of the conveyor, and during the transporting thereof by the conveyor passing the caps through a zone having an elevated temperature to render viscous an adhesive applied to the inner surface of the caps, or position the caps relative to means to supply an adhesive thereto in a semi-viscous state, or in a non-viscous state by supplying a disk as of paper impregnated with the adhesive to the caps, and then passing the caps through the zone of elevated temperature to render the adhesive fluid viscous, and then positioning the caps relative to means for applying sealing disks or pads of cork or composition cork to the adhesive carrying caps, and provide means to apply pressure to the sealing disks in the caps for a portion of the terminal travel of the cap carrying stretch of the conveyor. This pressure applying means comprises spring influence plungers carried by a second endless conveyor movable in synchronism and in parallel opposed relation to the cap carrying stretch of the cap transporting conveyor.

The conveyors are carried by rotatable supports and as the plunger carrying conveyor passes around its support to travel in opposed relation to the cap transporting conveyor the plungers have an angular orbit of movement with the result that as they approach the caps carried by the cap transporting conveyor they are liable to have a swiping contact with and unseat the caps from their seats, and to prevent this means is provided to guide the plunger carrying conveyor to position the plungers in alinement with the caps carried by the cap transporting conveyor before they are engaged with and the pressure thereof applied to disks in the caps. Means are also provided to adjust one of the conveyors relative to the other conveyor whereby to aline the cap carrying seats of the one conveyor with the plungers of the other conveyor.

In the drawings accompanying and forming a part of this application Figure 1 is a side elevation of the closure cap assembling apparatus illustrating an embodiment of the invention.

Figure 2 is a plan view of the apparatus shown in Figure 1.

Figure 3 is a side elevation of the delivery end of the apparatus to show the actuating means for the conveyors.

Figure 4 is a cross sectional view looking at the left of Figure 3.

Figures 5 and 6 are cross sectional views taken on the lines 5—5 of Figure 1, Figure 5 looking in the direction of the arrow *a* and Figure 6 looking in the direction of the arrow *b*.

Figure 7 is a cross sectional view, on an enlarged scale, taken through the opposed stretches of the plunger carrying and cap transporting conveyors to show the manner of placing the sealing disks in the caps under pressure.

Figure 8 is a side elevation, on an enlarged scale, of a portion of the opposed stretches of the conveyors and showing the manner of alining the pressure applying plungers with the caps carried by the cap transporting conveyor previous to the placing of the sealing disks in the caps under pressure of the plungers.

Figure 9 is a plan view of a portion of the cap transporting conveyor to show the arrangement of the plates arranged with the cap supporting seats.

Figure 10 is a perspective view of a portion of the delivery end of the cap transporting conveyor and showing means for ejecting the assembled closure caps therefrom.

Figure 11 is a perspective view to show the mounting of the adhesive applying device.

Figure 12 is a perspective view of adjustable supporting means for the plunger carrying conveyor to take up slack in said conveyor and also to position it relative to the cap transporting conveyor to aline the plungers with

the caps carried by the cap transporting conveyor previous to the engagement of the plunger with sealing disks in the caps.

Figure 13 is a perspective view of an adjustable support for the cap transporting conveyor to take up slack in said conveyor.

Figure 14 is a perspective view, on an enlarged scale, to show the manner of supporting closure caps arranged with a corrugated or ruffled margin in the seats of the cap supports of the cap transporting conveyor.

Figure 15 is a plan view of one end portion of the cap transporting conveyor and showing chutes arranged in relation thereto for delivery of the closure caps to the cap supporting seats of said conveyor.

Figure 16 is a cross sectional view in perspective and on an enlarged scale through the upper stretch of the cap transporting conveyor to show the supporting and guiding means therefor, and means to engage over marginal portions of the caps carried by said conveyors to retain them in the cap supporting seats.

Figure 17 is a side elevation, partly in section, of a fluid adhesive carrier arranged with syringe outlet means relative to which caps carried by the cap transporting conveyor are positioned to supply adhesive to the caps.

Figure 18 is a perspective view of a plunger of the syringe outlet means of the adhesive carrier.

Figure 19 is a cross sectional view showing means for stamping disks from adhesive carrying webs and the applying of such disks to caps carried by the cap transporting conveyor.

Figure 20 is a view looking at the top of Figure 19.

Figure 21 is an elevational view of the adjustable connection means between the closure cap transporting conveyor and its operating means.

Figure 22 is a view looking at the left of Figure 21, partly in section, and

Figure 23 is a perspective view of the means to control the actuation of the sealing disk delivery means by the transporting of the closure caps.

In the embodiment of the invention illustrated the operative parts are mounted upon a suitable framework comprising a table T mounted at the opposite ends upon standards S.

A conveyor in the form of an endless sprocket chain (designated in a general way by C), and herein termed as the cap transporting conveyor, is supported at one end by a sprocket wheel 21 fixed to a shaft 22 journaled at opposite ends in bearing members 23 fixed upon the table T, and the opposite end being supported by a sprocket wheel 24 fixed to a shaft 24' journaled in a bearing member 25 (Figures 1, 2, 13 and 15) slidably

mounted upon the table to have longitudinal adjustment by bolts passed through elongated slots in a flange of said bearing member, as at 26, and perforations in the table and secured in adjusted position by an adjustable abutment in the form of a set screw 27 threaded into a portion of the bearing member overhanging the end of the table to abut the end of the table and locked in adjusted position by a lock nut 28, and by means of which bearing member the sprocket wheel 24 is adapted to be adjusted to take up slack in the conveyor. Plates 29 are fixed in close sequence to the conveyor, in the present instance to laterally extended angle portions of alternate links, as at 30, of the chain (Figures 7, 8 and 9) with the opposite ends of the plates extending beyond the opposite sides of the conveyor chain and having a bifurcation 31 in the opposite ends, the connecting portion between the legs of the bifurcation being of arcuate shape to form cap supporting seats. The forward legs 32 of the plates are of slightly less length than the rear legs 33 and the ends of said legs are of arcuate form, as at 34, with the curved portion of the legs 32 merging in the inner edge of said legs, as clearly shown in Figure 9 and for a purpose to be hereinafter described.

The cap transporting conveyor travels with the upper stretch thereof moving from the right hand end to the left hand end of the apparatus as viewed in Figures 1 and 2. The caps are delivered to the seats of the cap supporting plates of the conveyor at the commencement of travel of said conveyor stretch, said means comprising chutes 35 leading from the outlet of the hopper or hoppers (not shown) to opposite sides of the conveyor with the outlets of the chutes arranged in the plane of travel of the cap supporting plates 29 and in line with the cap supporting seats therein, the caps 36 being delivered from the chutes by gravity. (Figure 15.) The said stretch of the conveyor is guided in its travel by a pair of parallel rails 37 mounted in vertical edgewise, parallel and spaced relation in recesses of brackets 38 fixed upon the table T and supported by the chain slidably engaging upon the upper edge of a rail 37' mounted on the brackets 38 and the chain links engaging between said rails, as clearly shown in Figure 16. Means are provided for retaining the caps delivered into the plate seats from the chutes and during the travel of the conveyor with the caps from the chute outlets, comprising a rail 40 having cross bars connected to the opposite ends the rail being arranged intermediate the caps seated in the cap supports with the opposite edges of the rail positioned to engage over the marginal portions of the caps in the plate seats, said rail being hingedly supported at one end, as at 41, whereby it

may be raised, as shown in dotted lines in Figure 1, for gaining access to the caps in the cap supports and said end of the conveyor, and releasably secured in position to engage over the conveyor by a locking latch 42 carried at the end of the frame opposite to that at which it is hinged and adapted to co-operate with a guard plate 43 fixed upon the sprocket wheel bearing member 25. (Figures 1, 2 and 13.) By the arrangement of the arcuate portion 34 at the end of the one leg of the cap supporting bifurcation in the end of the cap supporting plates the caps will readily enter the seats from the chutes.

The cap transporting conveyor is driven from a suitable source of power by a drive shaft 44 journaled in hangers 45 suspended from the bottom of the table to rotate on an axis transverse of the table, said shaft being driven by a belt 46 passing around a pulley 47 fixed on the shaft and said shaft also having a loose pulley 48 thereon juxtaposed to the fixed pulley to which the belt is adapted to be shifted by a shifter 49 to render the apparatus inoperative. The conveyor is intermittently actuated from the shaft through a Geneva mechanism comprising a wheel 50 mounted on the sprocket wheel carrying shaft 22 to rotate therewith, said wheel being in the form of a disk having recesses 51 equidistantly spaced about the periphery and extended radially inward, with the periphery of the portions between the recesses of curved or concave form, as at 52. The wheel 50 is actuated by pins 53 fixed in and extending laterally from a disk or wheel 54 fixed to a counter-shaft 55 continuously rotated from the shaft 44 by a sprocket chain 56 passing around sprocket wheels 57, 58 fixed on the shafts 55, 44, respectively. In the present instance the disk 54 is arranged with three equidistant spaced pins 53, and as the disk is rotated the pins are successively engaged in successive wheel recesses 51 whereby upon each revolution of the pin disk three intermittent movements of the same extent will be imparted to the wheel 50, and said latter wheel being held against movement during the periods of rest by a plate member 59 fixed on the shaft 55 juxtaposed to the pin wheel, said member being arranged with three projections equidistantly spaced between the pins and the ends arranged of arcuate or convex form, as at 60, to correspond with the curvature of the concave peripheral portions 52 of the wheel 50 and for sliding engagement therewith during the interim of movement of a pin 53 moving out of a recess 51 and the engagement of a successive pin in a successive recess.

The caps are retained against lateral displacement from the plate seats during the travel of the conveyor by a pair of rails 61 fixed on the brackets 38 at opposite sides of the conveyor to extend in the plane of travel

of the cap supporting plate. To hold the caps against upward displacement a pair of guide rails 62 is fixed upon the rails 61 with a longitudinal marginal portion projecting inwardly therefrom and over the lateral marginal portions of the caps seated in the cap supporting plates, and an intermediate rail 63 having the longitudinal marginal portions undercut and engaging over the inner marginal portions of the caps seated in the cap supporting plates, said rail being supported by crossbars 63' fixed thereto adjacent the ends and upon the rails 61. (Figures 4, 7 and 16.)

The caps are successively moved by the travel of the conveyor relative to adhesive supplying means, and then through a zone having an elevated temperature, and then to means to apply sealing disks to the adhesive carrying caps. In the structure of Figures 1 and 2 devices are provided for supplying an adhesive in a fluid state to the caps, and comprise adhesive carrying receptacles 64, one for each row of caps carried by the conveyor, said receptacles being adjustably carried by a projection 65 extending laterally from a head 66 slidably mounted in a slide-way in a pillar 80 mounted on the table and straddling the conveyor, the head being carried by rods 66' arranged at opposite sides of and vertically reciprocatory transversely of the line of travel of the conveyor, said adhesive receptacles being arranged in superposed relation to the lines of caps carried by the conveyor to have movement toward and away from the caps by the reciprocation of the head carrying rods. The receptacles have outlet means connected thereto, which is in the nature of syringes (Figures 11, 17 and 18) comprising receptacles having threaded connection with one end of tubes 68 threaded into and extended through openings in the projection 65 to have longitudinal adjustment and secured in adjusted position by nuts 69 threaded onto said tubes at opposite sides of said projection and to the upper end of which tubes the adhesive receptacles 64 are connected. The syringe receptacles are in communication with the adhesive carrying receptacles through the tubes 68. The syringe receptacles have outlets in the lower conical ends, and the discharge of the adhesive is controlled by plungers each embodying a head having one end arranged of conical form to correspond with the conical end of the receptacles and having an elongated teat 71 extended from the apex and slidably engaged in the receptacle outlets; the head also is arranged with radial and longitudinal extending ribs 72 for sliding engagement with the inner tubular wall of the receptacles, the plungers being normally urged to closing position by a spring 73 coiled about a pin 74 extending axially from the end of the head opposite to the teat and in line with the bore

of the tube 68, the spring being confined between the plunger head and the end of the tube connected with the receptacle. The adhesive carrying receptacles are reciprocated in timed sequence with the movements of the conveyor so that during the periods of rest of the conveyor the adhesive applying means will assume its lowermost position, the syringes being adjusted so that just previous to the terminus of the downward movement the plunger teats will engage caps, as shown in dotted lines at the bottom of Figure 17, and the continued downward movement of said means, due to the engagement of the plunger teats with the caps, moving the plungers inward against the action of the springs 73 and opening the outlets of the syringes to permit the adhesive to flow down the teats, the teats having a sufficiently loose fit with the walls of the outlet to permit of said flow of the adhesive. This contact of the teats with the caps is only momentary but of sufficient duration of time to permit of a spot or drop of adhesive to be supplied to the caps. The plungers 66' are reciprocated from a shaft 75 extending longitudinally of the apparatus and journaled in hangers 76 fixed to and extending downward from the table T, said shaft being driven from the shaft 44 through bevel gearing 77. The plungers are engaged by an eccentric on said shaft operatively connected with the plungers by a strap encircling the eccentric, as shown at 78, the strap having a laterally extending arm whereby it is pivotally connected with a cross-head in which the plungers are mounted, as shown at 79.

The adhesive carrying caps as they are advanced from the adhesive supplying devices are moved through a zone having an elevated temperature created by a suitable heating device, and shown as comprising gas burning means embodying pipes 81 arranged above and below the line of caps transported by the cap transporting conveyor and having burner orifices arranged to direct the flame toward the lines of caps, said burner means being connected with a source of supply by a pipe 82 with an interposed valve controlled mechanism 83, the pipes 84 connected with the supply pipe 82 having outlet ends terminating adjacent the burner pipes 81 to serve as pilot lights.

The devices for applying sealing disks to the adhesive carrying caps comprises plungers 85 adjustably carried by a laterally projecting portion 86 of a head 87 slidable in a pillar 88 fixed upon the table and straddling the cap transporting conveyor, said plungers being arranged above and in line with the caps carried by the cap transporting conveyor and having vertical reciprocatory movement toward and away from the caps, said plunger carrying head being reciprocated by an eccentric on the shaft 75 opera-

tively connected with the plunger carrying head by a strap encircling said eccentric, as at 88', pivotally connected, as at 89, to a cross-head 90 connected by rods 91 with the plunger carrying head 87. (Figure 5.) The sealing disks D are carried in stack formation in magazines in the form of tubes 92 fixed in and extending upward from blocks 93, which blocks are also arranged with guideways for the plungers 85 by arranging the same in spaced relation to supporting blocks 94 for slides 95 upon which the stacked disks are supported in normal position. The slides are reciprocatory in a direction transversely of the travel of the conveyor and eject the lowermost disks from the stacks and position the same relative to the plungers 85 to be delivered by the latter in caps carried by the cap transporting conveyor. The slides are reciprocated by actuators 96 slidably mounted in slideways in brackets 97 fixed upon the table at opposite sides of the conveyor. The slides 95 are seated in recesses in the slide actuators 96 with an end of the slides in abutting relation to a wall of said recess whereby as the slide actuators 96 are moved inward participating movement is imparted to the slide 95, and to impart return movement to the slides 95 they have a releasable connection with the slide actuators 96 comprising latches 98 pivotally carried by the slides 95 and adapted to engage in back of the slide actuators 96 to couple the slides and slide actuators together. The slide actuators are actuated from the shaft 75 by eccentrics 99, 100 fixed to said shafts. The eccentric 99 is connected with one slide actuator 96 by a strap 101 encircling the eccentric and pivotally connected by a rod 102 with one arm of a lever 103, as at 104, said lever being pivotally carried by a downwardly extending arm of a bracket 97 and having a pin and slot connection 105 with the slide actuator 96. The other slide 96 is connected with the eccentric 100 in a similar manner by a rod 106 connected with a strap 101' encircling the eccentric and having a pivotal connection 107 with a lever 108 having a pin and slot connection 109 with the slide actuator. Latches 98 are normally urged to releasing position by a spring detent 110. To prevent the delivery of a sealing disk from the stocks should there be no cap in a cap seat of the conveyor positioned relative to either of the plungers 85 means are provided to control the latch connection of the slides with the slide actuators by caps seated in the cap seats of the conveyor. For this purpose levers 111 are pivotally mounted on the sides of the supporting blocks 94 for the slides 95, with a horizontal portion of an upward extending arm of the lever engaging over a lateral extension 112 of the latches, (Figures 1, 2 and 5) and the opposite ends of the levers arranged with a feeler 113 by extending the end of the lever

at a right angle and in the direction of travel of the conveyor, said conveyor being adapted to be projected downward into the path of travel of the caps transported by the conveyor to be engaged by caps as they approach the plungers 85, and by the engagement of such caps, said end of the levers are moved upward and depressing the opposite ends and through the connection of the levers with the latch extensions 112 to move the latches 98 to engage the slide actuators 96 against the tension of the spring detents 110. Should there be no cap in a cap seat of the conveyor and consequently no support for the feeler end of the lever said end of the lever will be permitted to move downward through the action of the spring detents on the latch extensions 112 and the connection of the latter with the levers, thus releasing the latches from the slide actuators 96 and as retrograde movement is imparted to said slide actuators no participating movement will be imparted to the slides 95.

The means to place the sealing disks in the caps carried in the seats of the plates of the cap transporting conveyor comprises plungers carried by a conveyor in the form of an endless sprocket chain (designated in a general way by P), and herein termed the plunger conveyor, is supported at one end by a sprocket wheel 114 fixed to a shaft 115 journaled in an upward extension of the bearing members for the shaft 22 to rotate on an axis parallel with and superposed to said latter shaft, and by a sprocket wheel 116 fixed to a shaft 118 journaled in a slide 119 (Figure 12) adjustably mounted in a slideway of a yoke shaped block 120 and secured in adjusted position by bolts extended through the sides of the slide and elongated openings in the sides of the blocks, as at 121. The block is pivotally supported at one end between brackets 122 (Figures 1 and 2) mounted on the table at opposite sides of the cap transporting and plunger conveyors by pins fixed in said brackets engaged in openings 123 in the block. The sprocket wheel supporting slide is adjusted in the block by an adjustable abutment to take up slack in the conveyor, said abutment being in the form of a set screw 124 having threaded connection with an opening in the connecting portion of the yoke of the block and swiveled to the slide, as at 125. The opposite end of the block is adjustably supported to variably position it relative to the cap transporting conveyor, for a purpose to be hereinafter described, by rods 126 (Figure 1) adjustably mounted upon the table extend upward therefrom by extending the threaded end of said rods through openings in the table and clamping the same to the table by nuts threaded onto the rods at opposite sides of the table, as shown at 126' in Figure 1, said rods having pivotal connection at the upper

end with ears 127 projecting downward from the free ends of the legs of the block.

The plungers are in the form of headed pins 128 the stems of which are slidably engaged in perforations in the opposite ends of bars 129 with the pin heads extending outward from the conveyor and having collars 130 fixed on the other ends at the inner side of the bars, the plungers being yieldingly urged outward by springs 131 coiled about the plunger stems and confined between the heads and the bars. The plunger carrying bars are fixed to the chain in close sequence and spaced apart with the distance between the longitudinal centers of adjacent bars equal to the distance between the longitudinal centers of the cap supporting plates of the cap transporting conveyor. In the present instance the plunger carrying bars are fixed to laterally extending angle portions of alternate links 132 with the opposite ends of the plunger engaging perforations extending beyond the opposite sides of the conveyor chain. The lower opposed stretch of the plunger carrier is guided and maintained in predetermined spaced relation of the upper rail of the cap transporting conveyor by a rail 133 fixed to a bridge piece 134 straddling the lower conveyor stretch and fixed upon posts 135 fixed upon the table at opposite sides of the conveyor. The guide rail 133 engages between the chain links and with rollers mounted upon the link connecting pins, as clearly shown in Figure 7. The plunger engaging perforations in the bars are spaced apart a distance equal to the spacing of the cap supporting seats of the plates of the cap transporting conveyor, and as the opposed stretches of the conveyor come opposite each other the plungers will be automatically engaged with the sealing disks in the caps, and as the distance between said conveyor stretches is less than the length of the plungers the springs 131 will be slightly compressed when the plungers are engaged with the sealing disks and exert a yielding pressure upon the sealing disks in the caps and such pressure being applied for a sufficiently long enough period to cause the adhesive to partially set and secure the disks in the caps. The upper stretch of the plunger conveyor is supported by a bar 133' mounted on standards 134' fixed upon the table at opposite sides of the opposed stretches of the conveyors. With the axis of rotation of the sprocket wheel 116 of the plunger conveyor in the same plane with the axis of the sprocket wheel 114 as the plungers pass around the sprocket wheel 116 they would impart a swiping action to the caps in the cap seats in the plates of the opposed stretch of the cap supporting conveyor due to the travel of the angular orbit of movement of the plungers being greater than the linear movement of said caps with the possibility of unseating

the caps. For this purpose the adjustable bearing support 120 is provided for the shaft of sprocket wheel 116 so that the shaft may be positioned to rotate on an axis in a plane slightly higher than the axis of the shaft of sprocket wheel 114 with the result that the lower stretch of the plunger conveyor at said end of the conveyor will be slightly inclined in relation to the major portion of the travel of said conveyor stretch, and the plungers before they engage with the sealing disks in the caps of the cap transporting conveyor will be positioned in alinement with said caps, as shown at 128^a in Figure 8. The plunger conveyor is positively driven from and in synchronism with the cap transporting conveyor by a gear 136 (Figure 4) fixed to the sprocket wheel carrying shaft 22 meshing with a gear 137 on the sprocket wheel shaft 115 of the plunger conveyor.

Should the conveyor chains become slack for any reason, as by wear in the parts, and such slack be taken up by the adjustment of the bearing members 25 or 120 the plungers may be positioned out of alinement with the cap supporting seats in plates 29, and to compensate for this means are provided to adjust one conveyor longitudinally relative to the other conveyor after the slack has been taken up or at any time when found necessary, this adjustment being effected in the present instance by the adjusting of the cap transporting conveyor. For this purpose the Geneva wheel 50 is loose on the sprocket wheel shaft 22 and means are provided for releasably fastening it to the shaft to permit of adjustment of said shaft rotatively relative to said wheel. This means comprises a toothed wheel 138, preferably a worm wheel, fixed to the shaft 22 to which the Geneva wheel is releasably coupled. To couple the wheel 138 and thereby the shaft 122 with the Geneva wheel 50, the toothed wheel 138 is arranged with a cylindrical extension from one side of the same diameter with an annular recess therein to provide the wheel with an annular flange, as shown at 138' in Figure 22, said flanged end of the wheel being seated in a recess in the face of the Geneva wheel 50 of a depth slightly less than the width of the flange, as at 50', and releasably secured to said Geneva wheel by washers 139 engaged upon headed studs 139' threaded into the Geneva wheel 50 in interposed relation to the head of said studs and the Geneva wheel, the studs being arranged and the washers of a diameter so that the peripheral portion of the latter will engage or lap over a peripheral portion of the flange 138' and extend into the annular recess of the toothed wheel 138, as clearly shown in Figure 22. Any desired number of such securing studs and washers may be utilized, and in the present instance shown as three in number equidistantly spaced around the

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Geneva wheel 50. To adjust the sprocket wheel carrying shaft the washer securing studs 139' are released and the shaft is rotated relative to the Geneva wheel by a worm 140 rotatably mounted in ears extending laterally from the Geneva wheel and meshing with the teeth of wheel 138, the worm shaft being arranged for the application of a crank to rotate the same. After the shaft has been adjusted it is secured in adjusted position by drawing up the washers 139 to the flange 138' and thereby clamping the toothed wheel 138 to the Geneva wheel 50. It will be obvious that as the plungers reach the conveyor sprocket wheel 114 and pass around the same, and the cap supporting plates reach the sprocket wheel 21 the plungers will move out of engagement with the caps and release the caps in the cap supporting plates and as the cap transporting conveyor passes around sprocket wheel 21 they are ejected from the plate seats by ejectors in the form of U shaped members 141 of resilient material fixed to an angle portion of brackets fixed to the framework with the ejectors arranged in line with the cap seats in the cap supporting plates, said ejector members being arranged with a cushioning material 143, such as leather, for engaging the caps. (Figure 10.)

The belt shifter 49 is carried by a rod 144 slidably mounted in brackets 145 fixed to the shaft hangers 45 and having a hand grip fixed to a projecting end to actuate the same. It will be obvious that as the shifter is moved to shift the belt 46 from the fixed pulley, as shown in Figure 2, to the loose pulley 48 that the apparatus will be rendered inactive. It will also be obvious that should the gas burning means be connected with the source of gas supply during the inactive condition of the apparatus that it would not only destroy caps on the cap transporting conveyor positioned relative to said gas burning means, but it is liable to cause a fire. Means are therefore provided for actuating the gas control valve mechanism when the apparatus is rendered inactive to shut off the gas supply and to connect the same with the burner mechanism when the apparatus is set in operation. For this purpose means are provided for actuating the gas shut off valve simultaneously with the operation of the belt shifter, and comprising a rod 146 mounted to have longitudinal sliding movement in brackets projecting from the side of the table and connected at one end by a link 147 with the gas control valve, and at the opposite end by a link 148 with one arm of a bell crank lever 149 pivotally mounted on an arm projecting from one of the shifter rod supporting brackets 145, the other arm of the lever having a pivotal connection with the shifter rod, as clearly shown in Figure 2.

As stated, the apparatus is adapted for assembling of closure caps wherein the adhesive

is in the form of a lacquer applied to a surface of the metal from which the caps are formed and arranged at the inside of the caps, in which case the adhesive applying devices 64—71 are dispensed with since it is only necessary to subject the caps to heat to render viscous the adhesive coating, which is in a dry state on the caps.

The apparatus is also adapted for use with adhesive carried in a dry state by a vehicle, such as a disk of paper impregnated with the adhesive, and supplied to the caps previous to the passing of the caps through the zone having the elevated temperature, and in the applying of the adhesive to the caps in such form the disks are stamped from an adhesive carrying web or webs and deposited into the caps, and I have shown such means for this purpose in Figures 19 and 20. For this purpose two adhesive carrying webs W are guided to guideways 150 in the upper surface of a member 151 supported from the table to extend transversely over the cap carrying stretch of the conveyor in the position of the support 80 for the liquid adhesive supplying devices shown in Figures 1 and 2 and in contiguous relation to the cap supporting plates, said guideways having perforations there-through in the line of travel of the caps. A pair of punches 152 are carried in alined relation with said perforations by a head 153 slidably mounted in a pillar 154 supported upon the table at opposite sides of and bridging the conveyor, the webs being fed in interposed relation to the plungers and the perforated portion of the guideways 150 by feed pawls 155 loosely suspended from a rod 156 fixed in portions 156' extending upward from a carriage 157 mounted for reciprocatory movement upon the extended end of the member 151 to have movement relative to the guideways 151 in said member, and the feeding pawls yieldingly urged in a direction toward the guideways 150 by springs 158. The pawls are arranged so that when the carriage is moved in a direction toward the punches they will impinge upon the webs in the guideways and when reverse movement is imparted to the pawl carriage said pressure will be released from the webs. To prevent retrograde movement of the webs by the return movement of the feed pawls counterweighted detents 159 are fixed upon a rod 160 mounted at the ends in brackets fixed to the opposite sides of and extending upward from the guideways 150. The free ends of the detents are serrated and the detents are of a length greater than the distance between the supporting rod 160 and the guideways 150 and urged in a direction toward the guideways by the counterweights with the result that should there be any retrograde movement of the webs the serrated ends of the detents will bite into the material of the webs and hold them against movement. The punch carrying head is reciprocated with

the punches in timed sequence with the movement of the conveyor by an eccentric 161 fixed on the shaft 75 and operatively connected with the punch carrying head by a strap 162 encircling said eccentric having a pivotal connection 163 with a cross head 164' adjustably connected with the plunger carrying head by rods 164. The web feeding pawl carrying carriage 157 is actuated in timed sequence with the conveyor and punch carrier by an eccentric 165 fixed on shaft 75 having a strap 166 encircling the same connected by a rod 167 with a pivotally supported lever 168 having a pin and slot connection 169 with the carriage 157. Means are also provided for preventing the feeding of the webs when there are no caps in the cap supports of the cap transporting conveyor.

It will be obvious that various modifications may be made in construction and arrangement of parts, and that portions of the invention may be used without others, and come within the scope of the invention.

Having thus described my invention I claim:

1. In assembling apparatus for closure caps flared outwardly about the margin, an endless conveyor carrying successively arranged plates having cap receiving seats to receive and support the caps by engagement of the outwardly flared marginal portion of the caps only, cap delivery chutes relative to the outlets of which chutes the cap receiving seats in the plates are positioned by the travel of the conveyor, devices for applying adhesive and sealing disks to closure caps supported in said plate seats and relative to which devices said seats are successively positioned by the travel of the conveyor, and means for placing the sealing disks in the caps under pressure for a predetermined length of travel of the conveyor.

2. In assembling apparatus for closure caps, an endless conveyor carrying successively arranged plates having seats in the ends to receive and support closure caps, cap delivery chutes relative to the outlets of which chutes the cap supports in the plates are positioned by the travel of the conveyor, devices for applying adhesive and sealing disks to the closure caps carried in the cap supports of the plates and relative to which devices said supports are successively positioned by the travel of the conveyor, and means for placing the sealing disks in the caps under pressure.

3. In assembling apparatus for closure caps as claimed in claim 2, wherein the conveyor comprises a chain, and the plates of the cap receiving seats are carried in succession by the chain and the cap receiving seats are in the form of bifurcations in the ends of the plates.

4. In assembling apparatus for closure caps as claimed in claim 2, wherein the cap

receiving seats are in the form of bifurcations in the ends of the plates, the forward legs of the bifurcations of successive plates being of less length than the rear legs of the bifurcations of preceding plates and the ends of said bifurcation legs arranged of arcuate form merging with the inner edges of the legs.

5. In assembling apparatus for closure caps, an endless chain conveyor, plates carried by alternate links of the chain with the ends projecting from opposite sides of the chain and bifurcated to form cap supporting seats, means arranged at the sides and one end of the conveyor to deliver caps to the seats in the plates, means to support the upper stretch of the chain, means arranged above the plates of the upper conveyor stretch to overlap the marginal portion of caps in the plate seats to retain the caps seated therein during the travel of the conveyor, means arranged in line with the movement of the caps with the conveyor to supply adhesive to the caps and apply sealing disks to the adhesive supplied caps transported by the conveyor plates, and means to place the sealing disks in the caps under pressure during the latter portion of the travel of the upper stretch of the conveyor and released therefrom at the terminus of said travel.

6. In assembling apparatus for closure caps as claimed in claim 5, means at the terminus of the travel of the upper conveyor stretch operative when the pressure means is released from the caps for ejecting the caps from the plate seats.

7. Assembling apparatus for closure caps as claimed in claim 5, wherein the means to deliver caps to the seats in the plates comprises chutes arranged at the opposite sides of the conveyor with the outlets in the plane of travel of the plates and with which the cap receiving seats in the plates are brought into register.

8. In assembling apparatus for closure caps as claimed in claim 5, wherein the means to deliver caps to the seats in the plates comprises chutes having outlets arranged in the plane of travel of the plates, and an end portion of a lateral wall of each chute being pivotally supported within the end thereof and yieldingly urged to cap guiding position and adapted to be moved from said position by a cap improperly positioned relative to the plates for ejection of said cap by the travel of the plates.

9. Assembling apparatus for closure caps as claimed in claim 5, wherein the cap conveyor is intermittently operated and during the periods of rest is positioned with the cap receiving seats of the plates in line with the chute outlets and relative to the adhesive and sealing disk applying means.

10. Assembling apparatus for closure caps as claimed in claim 5, wherein the cap con-

veyor is intermittently operated, and the adhesive supplying means comprises plungers reciprocatory transversely of the direction of travel of the conveyor, and a fluid adhesive carrying receptacle carried by each plunger arranged with syringe outlet means to have movement with the plungers toward and away from the line of travel of the caps with the conveyor and operative in timed sequence with the movement of the conveyor to deposit adhesive in the caps during the periods of rest of the conveyor.

11. Assembling apparatus for closure caps as claimed in claim 5, wherein the cap conveyor is intermittently operated, and the means for supplying adhesive to the caps comprises plungers reciprocatory transversely of the direction of travel of the conveyor, syringes carried by and movable with the plungers toward and away from the line of travel of the caps with the conveyor and adapted to deposit adhesive in the caps during the periods of rest of the conveyor, and an adhesive supply receptacle in communication with the syringes.

12. In assembling apparatus for closure caps, an endless conveyor including plates arranged in close sequence with the ends extending beyond the opposite sides of the conveyor and arranged with cap supporting bifurcations therein, means to support and guide a stretch of the conveyor, means to deliver caps to said plate seats of the supported stretch of the conveyor, means to provide a zone having an elevated temperature through which the caps carried by the conveyor plates are passed in the travel of the conveyor to heat the caps and render viscous an adhesive carried by the caps, means relative to which the caps are positioned by the travel of the conveyor to apply sealing disks to the heated caps, and a plunger carrying conveyor movable in a plane parallel with a terminal portion of the travel of the supported stretch of the conveyor and movable in synchronism therewith, and said plungers adapted to place the sealing disks in the caps under pressure.

13. Assembling apparatus for closure caps as claimed in claim 12, wherein the means to apply sealing disks to the caps comprises plungers movable toward and away from the caps transported by the conveyor, and means operative in timed sequence with the plungers to position sealing disks relative to the plungers.

14. Assembling apparatus for closure caps as claimed in claim 12, wherein the means to apply sealing disks to the caps, comprises magazines arranged at opposite sides of the conveyor having disks stacked therein, plungers movable toward and away from the caps transported by the conveyor, and slides movable transversely of and alternately with the plungers to deliver the lowermost

disks from the stacks and position the same relative to and be delivered by the plungers to the caps.

15. In assembling apparatus for closure caps, an endless conveyor arranged with successive cap supporting and transporting seats, means to actuate the conveyor, means at one end of a stretch of the conveyor to deliver caps to the cap supporting seats, devices relative to which the caps transported by the conveyor are positioned to supply adhesive to the successive caps and apply sealing disks to the successive adhesive carrying caps, a plunger carrying conveyor arranged in parallel relation to a portion of the end of the stretch of the cap transporting conveyor opposite to that at which the cap delivery means is arranged and the plungers carried thereby adapted to engage and place the sealing disks in the caps under pressure, means to actuate the plunger conveyor in synchronism with the cap transporting conveyor, and means to guide the plunger carrying conveyor to position the plungers in alined relation to the caps carried by the cap transporting conveyor previous to the engagement of the plungers therewith.

16. In assembling apparatus for closure caps as claimed in claim 15, means to adjust one conveyor longitudinally relative to the other conveyor to aline the cap supports of the one conveyor with the plungers of the other conveyor.

17. In assembling apparatus for closure caps as claimed in claim 15, means to adjust the cap transporting conveyor to aline the cap supporting seats with the plungers of the plunger conveyor.

18. Assembling apparatus for closure caps as claimed in claim 15, wherein the conveyors comprise sprocket chains, and sprocket wheels around which the chains are passed, and the actuating means for the cap transporting conveyor is operative to intermittently actuate said conveyor and the plunger carrying conveyor is actuated from the actuating means for the cap transporting conveyor.

19. Assembling apparatus for closure caps as claimed in claim 15, wherein the conveyors comprise chains, sprocket wheels fixed to rotatable shafts carrying said chains, and means for intermittently actuating the conveyors in synchronism, comprising a wheel fixed to a sprocket wheel carrying shaft of the cap transporting conveyor arranged with recesses equidistantly spaced about the periphery and extending radially inward and the peripheral portions between the recesses of concave form, a counter-shaft, a disk on said shaft having pins equidistantly spaced about and extending laterally from the disk for engagement in the wheel recesses, a member juxtaposed to the disk arranged with convex portions intermediate the pins for en-

gagement with the concave portions of the wheel alternately with the engagement of the disk pins in the wheel recesses, a drive shaft, means to connect and operate the pin disk from said shaft, and an operative connection between the one sprocket wheel carrying shaft of the plunger conveyor and the recessed wheel carrying shaft of the cap transporting conveyor.

20. Assembling apparatus for closure caps as claimed in claim 15, wherein the conveyors comprise chains, sprocket wheels fixed on rotatable shafts carrying said chains, the shafts of the cap transporting conveyor being journaled in bearings to rotate on axes in the same plane, the shaft of the sprocket wheel of the plunger conveyor at the delivery ends of the conveyors being journaled in a fixed bearing in superposed relation to the sprocket wheel carrying shaft of the cap transporting conveyor at said end, and the other sprocket wheel carrying shaft of the plunger conveyor being adjustable in a direction toward and away from the cap transporting conveyor to permit the plungers to assume an alined position with the caps carried in the cap supporting seats of the cap transporting conveyor previous to engagement with said caps, and means to guide the opposed stretches of the conveyors and maintain the same in predetermined spaced relation.

21. Assembling apparatus for closure caps as claimed in claim 15, wherein the plunger conveyor is superposed to the cap transporting conveyor and each conveyor comprises a chain and rotatable sprocket wheels carrying said chains, the sprocket wheels for the cap transporting conveyor being rotatable on axes arranged in the same plane, the one sprocket wheel for the plunger conveyor being rotatable on an axis superposed to and parallel with the axis of the sprocket wheel at the delivery end of the cap transporting conveyor, and the other sprocket wheel for the plunger conveyor being arranged intermediate the ends of the cap transporting conveyor and adapted to have adjustment in a direction toward and away from said conveyor, means to support and guide the upper stretch of the cap transporting conveyor, and means to guide and position the lower stretch of the plunger conveyor relative to the upper stretch of the cap transporting conveyor.

22. Assembling apparatus for closure caps as claimed in claim 15, wherein the conveyors comprise chains, sprocket wheels fixed to shafts carrying said chains, gearing to positively drive a sprocket wheel of one conveyor from a sprocket wheel of the other conveyor, a drive wheel loose on one of said sprocket wheel carrying shafts, and means to positively couple said drive wheel with the shaft and permit of rotative adjustment of the shaft relative to the drive wheel to adjust

one conveyor relative to the other and aline the plungers with the cap supports.

23. Assembling apparatus for closure caps as claimed in claim 15, wherein the conveyors comprise chains, sprocket wheels fixed to shafts carrying said chains, a gear fixed to a sprocket wheel shaft of the cap transporting conveyor meshing with a gear fixed to a sprocket wheel shaft of the plunger conveyor, a drive wheel loose on the gear carrying shaft of the cap transporting conveyor, a gear fixed to said shaft juxtaposed to the drive wheel, clamping washers engaged on headed studs threaded into the drive wheel and overlapping a peripheral portion of an annular flange of said gear, and a worm rotatably carried on the side of the drive wheel and meshing with said gear operative to rotatably adjust said gear with the connected sprocket wheel carrying shaft relative to the drive wheel to adjust the cap transporting conveyor to aline the cap supporting seats thereof with the plungers of the plunger conveyor.

24. Assembling apparatus for closure caps as claimed in claim 15, wherein the conveyors comprise sprocket chains, sprocket wheels fixed to shafts carrying said chains, a gear fixed to one of said sprocket wheel shafts of the cap transporting conveyor meshing with a gear fixed to a sprocket wheel shaft of the plunger conveyor to positively drive the plunger conveyor from and in synchronism with the cap transporting conveyor, a drive wheel on said gear carrying sprocket wheel shaft of the cap transporting conveyor, and means to rotatably adjust said drive wheel carrying shaft relative to the drive wheel to adjust the cap transporting conveyor relative to the plunger conveyor to aline the cap supporting seats of the one conveyor with the plungers of the other conveyor.

25. In assembling apparatus for closure caps, a conveyor arranged with means to support and transport caps, means to deliver caps to the cap supports of said conveyor, devices for supplying adhesive to the caps carried by said conveyor and for applying sealing disks to the adhesive carrying caps, gas burning means having valve controlled means for connection with a source of gas supply and arranged relative to the cap transporting conveyor and interposed between the adhesive supplying and sealing disk applying devices to provide a zone having an elevated temperature through which the caps with the adhesive pass to the sealing disk applying devices, a plunger carrying conveyor having a stretch thereof juxtaposed in parallel relation to a stretch of the cap transporting conveyor to place the sealing disks under pressure in the caps, means to positively drive the one conveyor from and in synchronism with the other conveyor, a drive shaft having an operative connection with one of the convey-

ors to drive the same, said shaft having a pair of pulleys mounted thereon one of which is fixed and the other loose, a belt shifter having a connection with the control valve of the gas burning means operative to shut off the gas burning means from the gas supply when the belt is shifted to the loose pulley to render the apparatus inactive and to connect said gas burning apparatus with the source of supply when the belt is shifted to the fixed pulley to render the apparatus active.

26. Assembling apparatus for closure caps as claimed in claim 15, wherein the cap supports of the cap transporting conveyor comprise plates fixed in equidistant spaced relation on the conveyor with the opposite ends projecting from the sides thereof and having bifurcations therein to receive and support the caps at the marginal portion.

27. Assembling apparatus for closure caps as claimed in claim 15, wherein the pressure applying plungers of the plunger conveyor comprise headed pins, bars fixed to said conveyor in equidistant spaced relation on the conveyor, said bars having perforations in the opposite ends extending from the sides of the conveyor in which the pins are slidably mounted, collars fixed to the ends of the plunger pins at the inner side of the bars, and springs coiled about the pins and confined between the heads thereof and the bars to urge the plungers outward.

28. Assembling apparatus for closure caps as claimed in claim 12, wherein the means to supply sealing disks to the caps comprises magazines arranged at opposite sides of the conveyor having sealing disks stacked therein, plungers movable toward and away from the caps transported by the conveyor, slides movable transversely of and alternately with the movement of the plungers to deliver the lowermost disks from the stacks and position the same relative to the plungers to be delivered thereby to the caps, actuators for said slides, means to releasably couple said slides with the actuators, and means controlled by caps in the seats of the cap supporting plates to actuate said coupling means to couple the slides with the actuators to render the slides active.

29. In assembling apparatus for closure caps, an endless conveyor, plates fixed in successive arrangement to the conveyor with the opposite ends extending from opposite sides of the conveyor and arranged with cap receiving and supporting seats in the opposite ends, cap delivery chutes relative to the outlets of which chutes the cap receiving seats in the plates are positioned by the travel of the conveyor, devices for delivery of sealing disks to the closure caps supported in said plate seats and relative to which devices said seats are successively positioned by the travel of the conveyor; a zone having an elevated temperature through which the caps in the

plate seats are passed for a predetermined length of conveyor travel, and means for placing the sealing disks assembled in the caps under pressure.

30. In assembling apparatus for closure caps, an endless conveyor arranged with successive cap supporting seats, means to actuate the conveyor, means at one end of the conveyor to deliver caps to the cap supporting seats, devices relative to which the caps transported by the conveyor are positioned to apply sealing disks to the successive caps, a plunger carrying conveyor arranged in parallel relation to the cap transporting conveyor and the plungers carried thereby being adapted to engage and place the sealing disks in the caps under pressure, and means to actuate the two conveyors in synchronism.

31. In assembling apparatus for closure caps as claimed in claim 30, means to create a zone having an elevated temperature through which a predetermined length of the cap transporting conveyor travels to heat caps and render an adhesive in the caps viscous.

32. In assembling apparatus for closure caps, an endless conveyor arranged with successive cap supporting seats, means to deliver caps to the cap supporting seats, devices relative to which the caps transported by the conveyor are positioned to apply sealing disks to successive caps, a plunger carrying conveyor arranged to travel relative to the cap transporting conveyor with one stretch of one conveyor juxtaposed to a stretch of the other conveyor and the plungers carried thereby adapted to engage and place the sealing disks in the caps under pressure, means to actuate said conveyors in synchronism, and means to adjust one conveyor relative to the other conveyor to aline the cap supports and plungers.

Signed at New York city, in the county of New York and State of New York, this 24th day of May, A. D. 1928.

JOHN A. JOHNSON.