June 4, 1946. H. E. RUE 2,401,511

PREHEATER FOR BOTTLE CAPS

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Fig. 1.

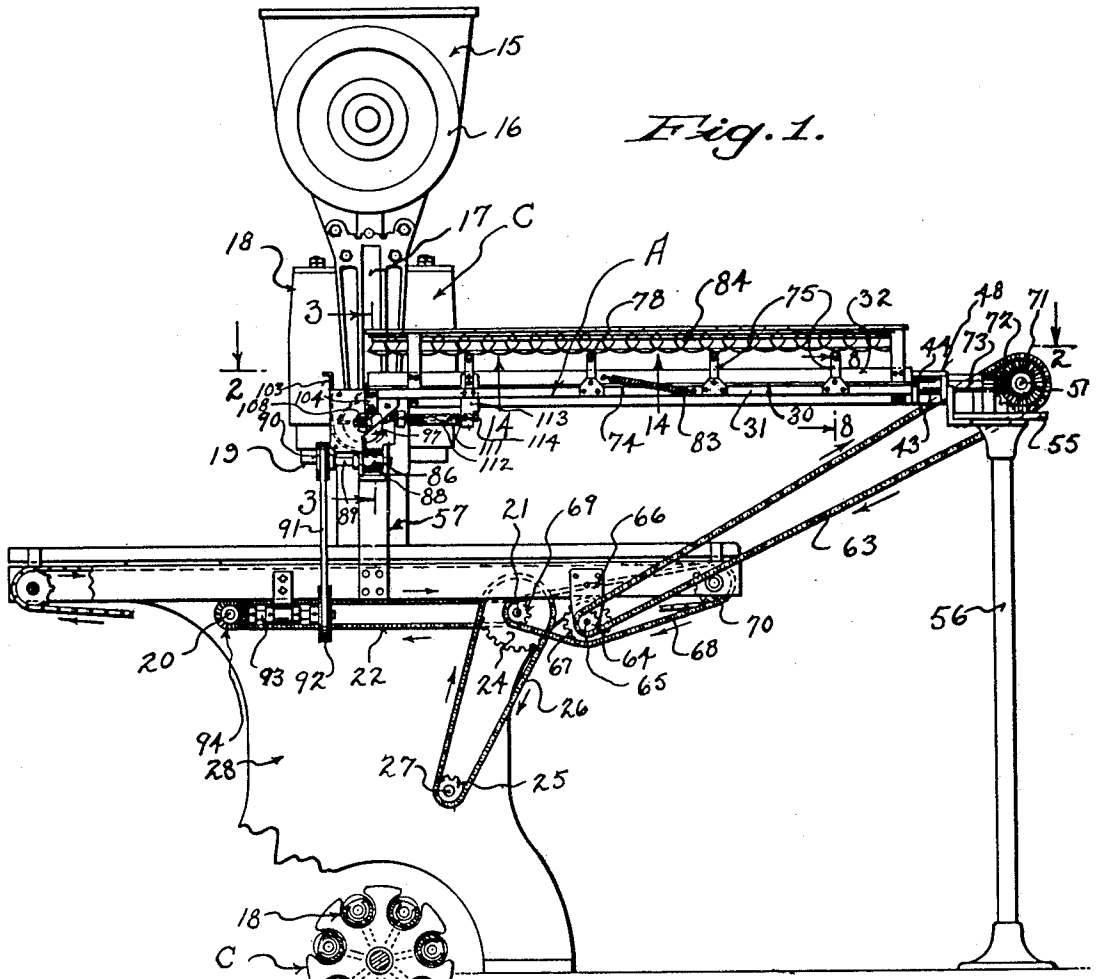
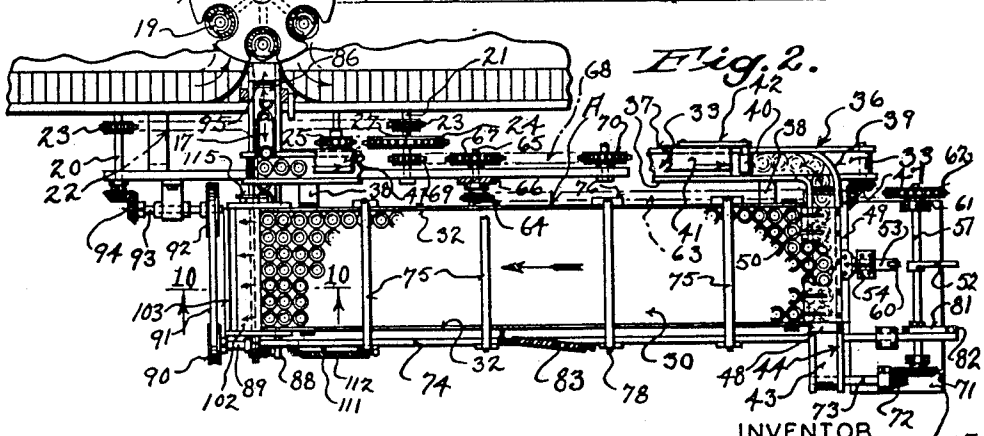


Fig. 2.



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Fig. 3.

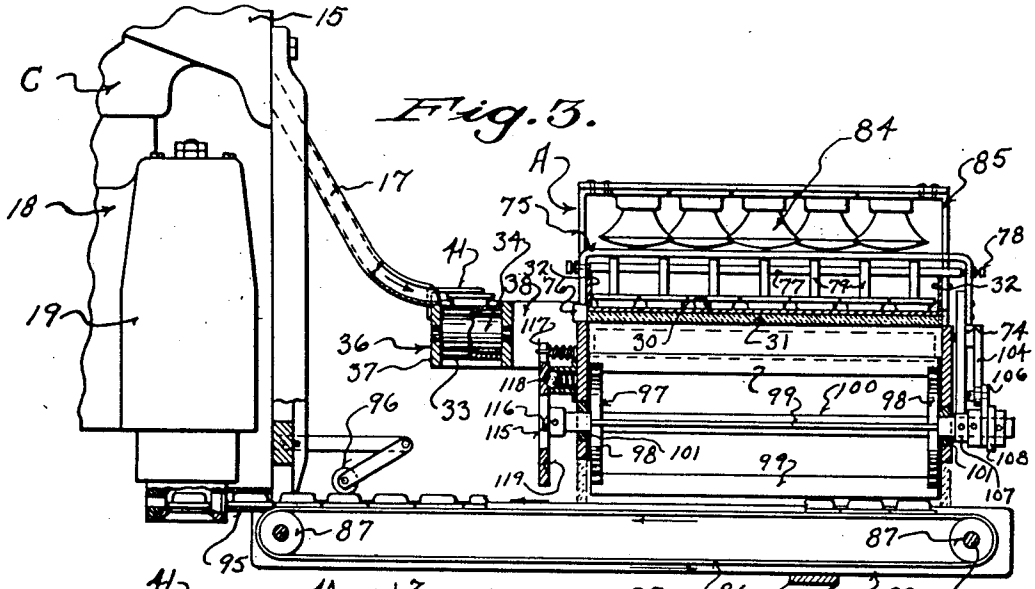
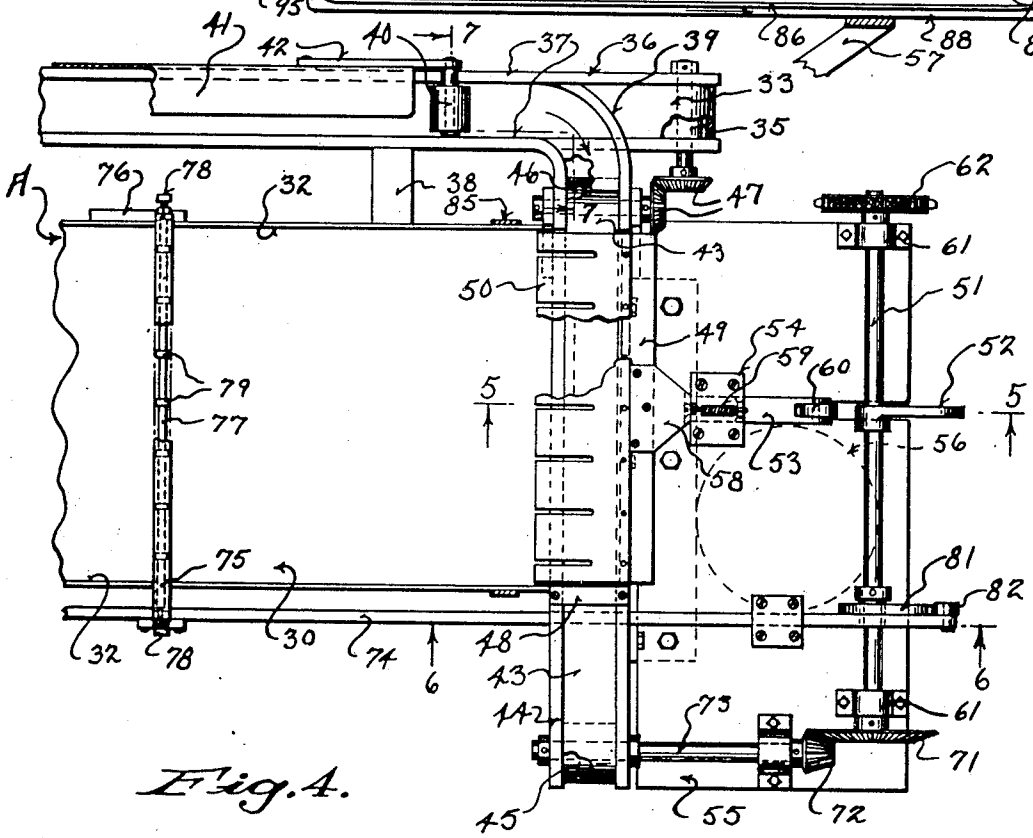


Fig. 4.



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Fig. 5.

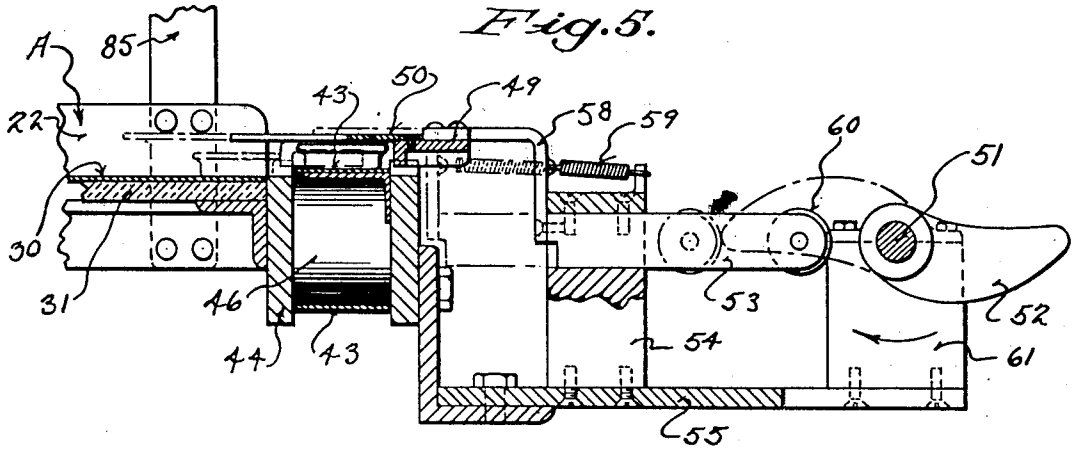


Fig. 6.

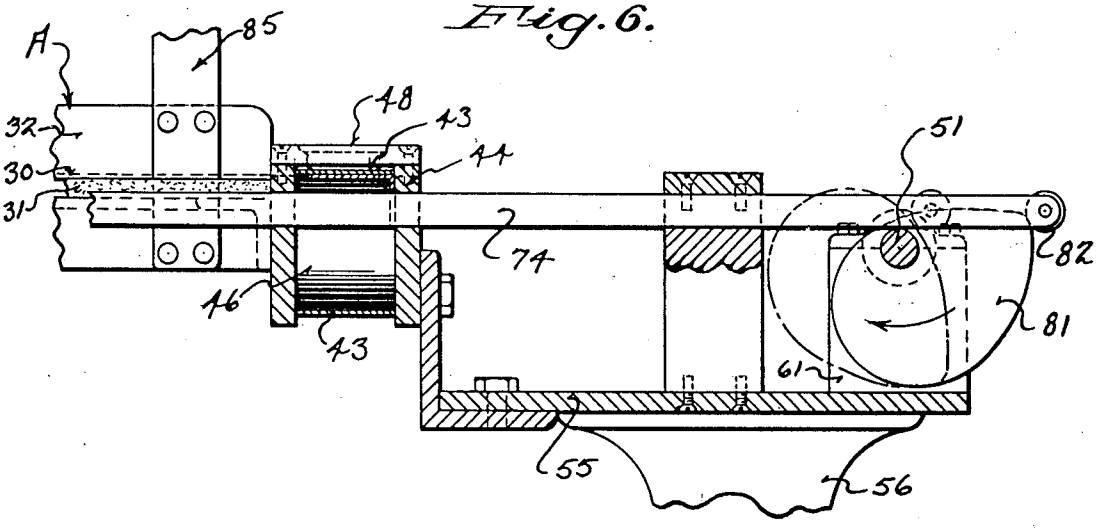
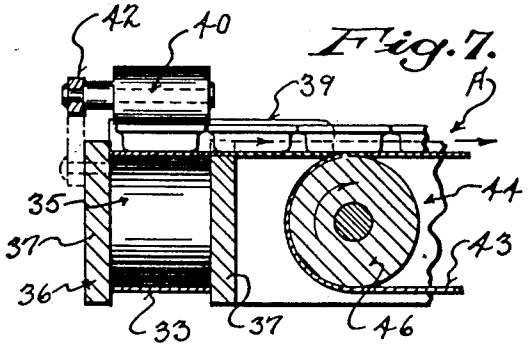


Fig. 7.



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Fig. 8.

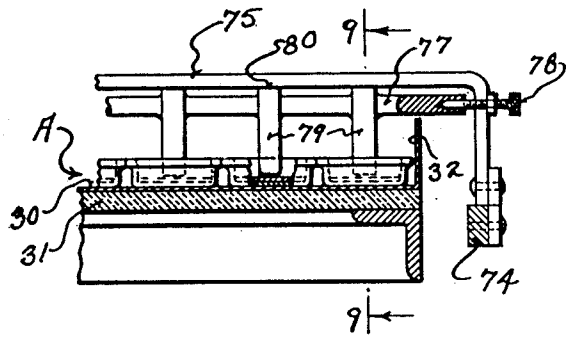


Fig. 9.

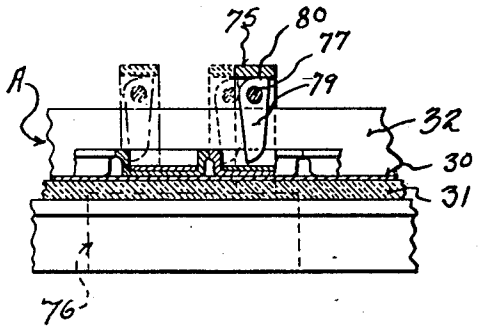


Fig. 10.

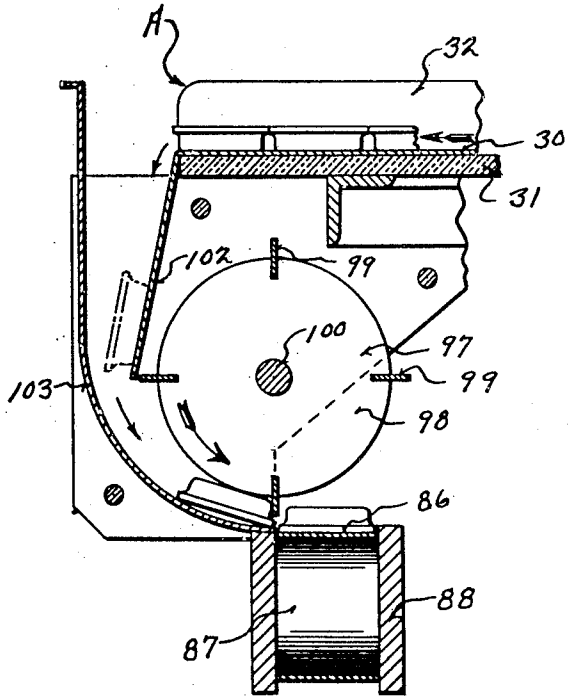
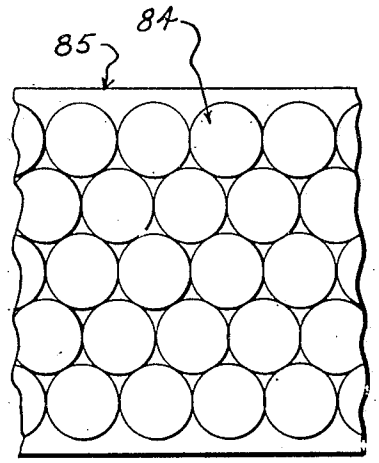


Fig. 14.



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Fig. 11.

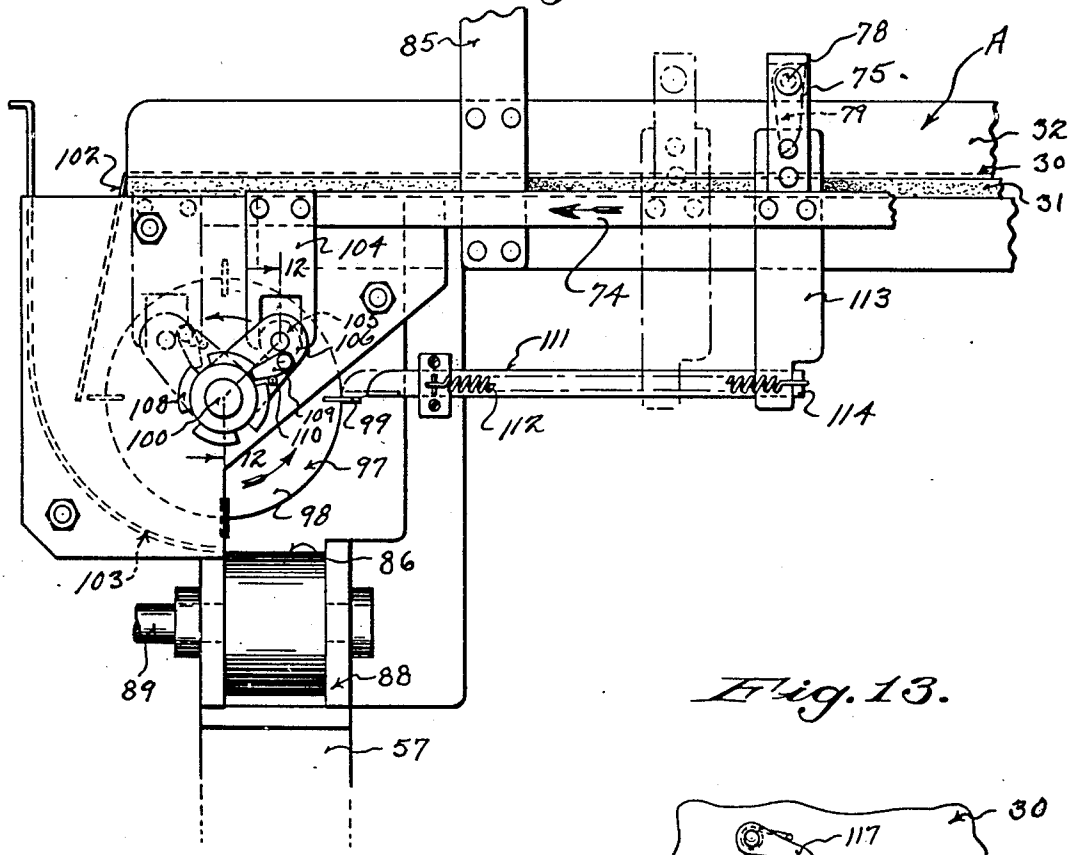


Fig. 13.

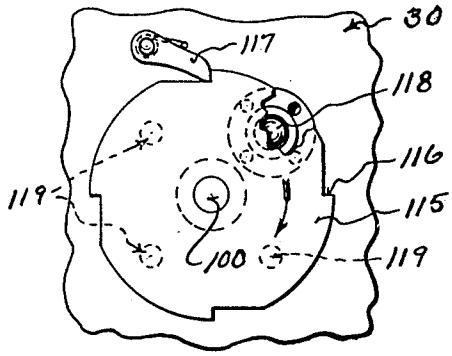


Fig. 12.

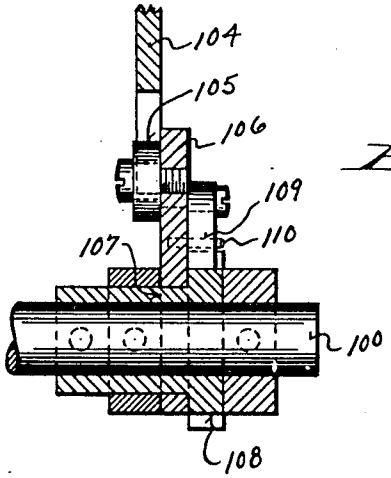
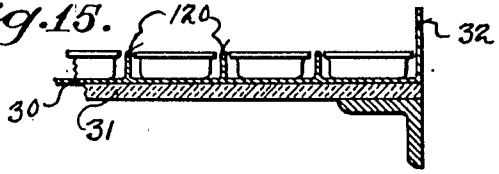


Fig. 15.



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Patented June 4, 1946

2,401,511

UNITED STATES PATENT OFFICE

2,401,511

PREHEATER FOR BOTTLE CAPS

Harold E. Rue, Wauwatosa, Wis., assignor to Pabst Brewing Company, Milwaukee, Wis.

Application November 8, 1943, Serial No. 509,413

17 Claims. (Cl. 226—88.1)

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This invention appertains to bottle capping and more particularly to a novel device for supplying preheated plastic crown caps to a bottle crowning machine and the invention is an improvement over my prior application, Serial No. 489,771, filed June 5, 1943.

One of the primary objects of my present invention is to provide means for insuring the thorough and proper heating of the skirts of all of the plastic caps prior to the delivery thereof to the crowning machine, so as to bring about the effective crimping or molding of the caps on the bottles and thereby insure the tight sealing of the bottles.

Another salient object of my invention is the provision of novel means for feeding the caps to the crowning machine, whereby not only will ample time be given for the proper heating of the skirts of the caps, but whereby the feeding of the heated caps to the crowning head will be insured at the rate that they are being used.

A further object of my invention is to provide a feed table for the caps arranged between the hopper for the caps and the crowning head casing having means associated therewith for heating the caps with means for advancing the caps on the table toward the crowning head casing in multiples to agree with the number of crowning heads on the rotary crowning head casing.

A further important object of my invention is the provision of means for heating and feeding the caps from the hopper to the crowning machine which includes a feed table for the caps with novel means for advancing the caps in transverse rows longitudinally of the table and means for receiving one transverse row of heated caps at a time for feeding to the crown head casing; the number of caps in each transverse row agreeing with the number of crowning heads on the crowning head casing.

Another salient object of my invention is the provision of novel means for advancing the transverse rows of caps in proper time along the table with means for holding the caps flat on the table, whereby crowding of the caps one on top of the other will be prevented.

A still further object of my invention is the provision of advancing means along the length of the table for engaging certain transverse rows of the caps, whereby the caps can be expeditiously moved from one end of the table to the other without danger of the rows of caps crowding one another and riding up on top of one another, said means including reciprocatory advancing bars

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having novelly arranged hinged fingers for engaging individual caps of the transverse rows.

A still further object of my invention is the provision of an endless conveyor belt arranged at one end of the feed table for carrying one row of caps at a time to the crowning machine with novel means associated with the table for delivering one row of caps at a time from the table to the belt, said means being so arranged as to reverse the position of the caps as the same are delivered to the belt, so that the caps will be turned from their heating position to proper position for feeding to the crowning heads.

A still further object of my invention is the provision for operating the various parts of the advancing and feeding mechanism in proper timed relation relative to one another, so that the caps will be fed in multiples to agree with the number of crowning heads on the crowning machine and heated at the rate that they are being used.

With these and other objects in view, the invention consists in the novel construction, arrangement and formation of parts as will be hereinafter more specifically described, claimed, and illustrated in the accompanying drawings, in which drawings:

Figure 1 is a front, elevational view showing my novel cap feeding and preheating mechanism incorporated with a bottle crowning machine.

Figure 2 is a horizontal, sectional view taken on the line 2—2 of Figure 1 looking in the direction of the arrows, the view showing the feed table in top plan.

Figure 3 is a transverse, cross, sectional view taken on the line 3—3 of Figure 1 looking in the direction of the arrows illustrating the means employed for delivering one transverse row of caps at a time to the cap feeding belt for the crowning machine in an inverted position with the skirts lower-most, the view being on a larger scale than Figures 1 and 2.

Figure 4 is an enlarged, fragmentary, top, plan view showing the forward or cap receiving end of the feed table, the view illustrating the reciprocating pusher cross head for pushing the caps toward the front or delivery end of the table and one of the cap advancing cross bars.

Figure 5 is an enlarged, fragmentary, longitudinal, sectional view taken on the line 5—5 of Figure 4 looking in the direction of the arrows illustrating one preferred means for operating the reciprocating pusher cross head.

Figure 6 is a view similar to Figure 5 but taken on the line 6—6 of Figure 4 looking in the direction of the arrows illustrating the means for

operating the push rod for the advancing cross bars.

Figure 7 is a fragmentary, detail, sectional view taken on the line 7—7 of Figure 4 looking in the direction of the arrows illustrating one form of means for supplying the caps to the feed table.

Figure 8 is an enlarged, fragmentary, detail, cross, sectional view through the feed table taken on the line 8—8 of Figure 1 looking in the direction of the arrows illustrating one of the novel advancing cross bars and the cap engaging fingers or dogs carried thereby.

Figure 9 is a fragmentary, longitudinal, sectional view through the feed table taken on the line 9—9 of Figure 8 looking in the direction of the arrows showing one of the advancing cross bars, the view showing different positions of the cross bars and cap engaging fingers in dotted lines.

Figure 10 is a fragmentary, longitudinal, sectional view taken on the line 10—10 of Figure 2 illustrating the means for delivering one transverse row of caps at a time in their inverted position from the feed table to the bottle cap feeding belt for the capping machine.

Figure 11 is an enlarged, fragmentary, side, elevation view of the rear or delivery end of the feed table illustrating one preferred form of means for operating the paddle wheel means for delivering one transverse row of caps at a time from the feed table to the feed belt in proper timed relation relative to other working parts of the apparatus, the view also showing the latch bar mechanism employed for holding the paddle wheel in proper position for receiving one transverse row of caps from the table for delivery to the feeding belt.

Figure 12 is an enlarged, fragmentary, detail, sectional view taken on the line 12—12 of Figure 11 showing a part of the operating mechanism for turning the paddle wheel a quarter of a revolution at a time.

Figure 13 is an enlarged, fragmentary, detail, side, elevational view showing the opposite end of the paddle wheel shaft from Figure 11 and illustrating the means for preventing accidental turning of the paddle wheel and shaft.

Figure 14 is a fragmentary view taken on the line 14—14 of Figure 1 looking in the direction of the arrows illustrating one preferred arrangement of the battery of infrared lamps for heating the skirts of the caps.

Figure 15 is a fragmentary, transverse, sectional view through the table illustrating a modified form thereof.

Referring to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter A generally indicates my novel bottle cap feeding and heating apparatus for a bottle capping machine C.

The crowning machine C can be of the general character shown in my pending application and the same includes a hopper 15 for my plastic crown caps and the caps are fed by a feed dial assembly 16 to a depending chute 17, which delivers the caps to my novel apparatus A. The crowning machine C includes a rotary crowning head casing 18 and the casing includes seven crowning heads 19. The crowning head casing and the crowning heads thereon are constructed in accordance with the invention mentioned in my pending application and bottles are fed to the crowning heads in proper timed relation by means of a star wheel (not shown) and the bottles are removed from the crowning heads after the crowning operation by a similar star wheel (also not shown). In Figure 2 of the drawings I have shown the operating shaft 20 for the delivery crown wheel and the operating shaft 21 for the take off star wheel, in that parts of the mechanism for operating my apparatus A are driven from these shafts. By still referring to Figure 2, it can be seen that these shafts are driven in exact timed relation relative to one another through the medium of a sprocket chain 22 which is trained about sprocket wheels 23 of like size keyed or otherwise secured to the shafts 20 and 21. The shaft 21 also has keyed or otherwise secured thereto a relatively large sprocket wheel 24 which is driven from a drive sprocket wheel 25 by means of a sprocket chain 26. The sprocket wheel 25 is fastened to a main drive shaft 27 which is operated from the motor (not shown) of the crowning machine C and this motor, as in the usual construction, is housed within the base 28 of the machine C. The various parts of my cap feeding and heating apparatus A are driven from the shafts 20 and 21 as will hereinafter more fully appear.

My novel bottle cap feeding and heating apparatus A comprises an elongated flat feed table 30 which is preferably arranged at the front of the machine and below the hopper 15. The table 30 can be formed from any preferred material, such as metal, and the same is preferably provided with a sheet of insulation 31 on its lower face. If preferred, the table 30 can be cooled by artificial means (not shown). The longitudinal side edges of the table are provided with upstanding guide flanges 32. The inner end of the table terminates adjacent to but slightly above the point of the feeding of the caps to the capping heads 19 of the rotary cap crowner 18 and as the caps are supplied to the forward end of the table the caps have to travel the full length of the table before reaching the crowning machine.

The means for feeding the caps to the forward end of the table can comprise a longitudinally extending bottle cap feed belt 33. This belt extends along the inner side of the table and travels over end pulley wheel 34 and 35. A frame 36 is provided for supporting the pulley belt 33 and the shafts for the pulley wheels and this frame includes side frame pieces 37 which extend slightly above the top of the conveyor or pulley belt 33 so as to prevent the riding of the caps from off of the side edges of the belt. Brackets 38 can be utilized for connecting the supporting frame for the conveyor belt to the table.

By referring to Figures 2 and 3, it can be seen that the chute 17 leading from the hopper 15 is provided with a lower curved end which extends toward the belt 33 so that the caps from the hopper will be delivered to said belt. Adjacent the end of the conveyor, remote from the chute 17, is an arcuate guide 39 for directing the caps from the conveyor 33 toward the table 30. To facilitate the carrying of the caps to the table and to prevent the riding of the caps one upon the other as the same reach the curved guide 39, I provide a spring pressed idler wheel 40. This wheel engages the skirts of the caps and insures proper traction between the caps and the conveyor belt adjacent to the curved guide so that the caps will move around the guide. I can also provide a longitudinally extending guard lip 41 and this lip extends over the conveyor belt and also functions to hold the caps flat on the belt against riding one upon the other. The roller

40 can be rotatably carried by a swinging lever 42 rockably mounted on the supporting frame 36. It can be seen that the caps are delivered to the conveyor belt with their skirts upper-most and hence the caps will be delivered to the feed table 30 with their skirts upper-most. This is the desirable position of the caps, in that the skirts only of the caps are to be heated to the necessary temperature.

In order to deliver the caps to the forward end of the table in transverse rows, I provide a transversely extending conveyor belt 43 at said far end of the table which receives the caps from the guide 39 and this conveyor is mounted in a frame 44 secured to the table. The frame 44 rotatably supports pulleys 45 and 46. The shaft of the pulley 46 is operatively connected to the shaft of the pulley 35 by means of intermeshing beveled gears 47. Hence the belts 33 and 43 are driven in unison. The frame 44 for the belt 43 is provided with a stop 48 for the caps so as to hold a row of caps on the belt in proper position to be delivered to the table 30.

The means for delivering a transverse row of caps to the table includes a reciprocating pusher plunger or cross head 49. The pusher plunger or cross head 49 is provided with a forwardly extending plate 50 which normally extends over the top of the belt 43 so as to prevent the riding of the caps over one another as the same travel on the belt. When the plunger 49 is pushed toward the table and over the belt 43 the transverse row of caps on the belt will be delivered to the table.

The means for reciprocating the cross head or plunger 49 includes a transversely extending main operating shaft 51 and the shaft has secured thereto a wiper cam 52. Normally urged toward the wiper cam is a push rod 53 which is slidably mounted in a bearing bracket 54. This bearing bracket 54 is mounted upon a supporting plate 55 which forms a part of the frame for the table 30. Any preferred means can be provided for supporting the table and its associate parts in correct position relative to the bottle capping machine C and as shown I have provided a post or column 56 connected with the plate 55 and a bracket 57 carried by a part of the capping machine C.

Referring back to the operating mechanism for the pusher plunger or cross head 49, it can be seen that the push rod 53 is connected to a bracket 58 which is in turn rigidly connected to said cross head. A contractile coil spring 59 is employed for normally pulling the push rod toward the wiper cam and the rod is provided with an anti-friction roller 60 which the wiper cam engages. Obviously, during rotation of the shaft 51 the cam 52 will act on the pusher rod and move the cross head forwardly over the table.

Suitable bearings 61 carried by the plate 55 are provided for rotatably supporting the main drive shaft 51. The main drive shaft 51 has keyed or otherwise secured thereto a sprocket wheel 62 and this sprocket wheel 62 is driven by a sprocket chain 63 forming a part of the operating mechanism of the bottle capping machine C. As illustrated, the sprocket chain 63 is trained about a relatively small sprocket wheel 64, keyed to a stub shaft 65. This stub shaft is rotatably supported by a depending bracket 66 supported from the frame of the table 30. The shaft 65 also has secured thereto a driven sprocket wheel 67 which meshes with a drive sprocket chain 68. This sprocket chain 68 is driven from a sprocket

wheel 69 keyed or otherwise secured to the shaft 21, which, as stated, is employed for operating the take off star wheel (not shown) of the capping machine C. The sprocket chain 68 is also trained about a sprocket wheel 70 which forms a part of the bottle conveyor drive of the capping machine. Hence, it can be seen that the main drive shaft 51 is driven from the bottle capping machine C. Also secured to the main drive shaft 51 is a bevelled gear 71 which meshes with a bevelled pinion 72 keyed or otherwise secured to the shaft 73 of the pulley 45 for the transverse belt 43. The shaft 51 also drives the belt 43 and the belt 43 in turn drives the belt 33.

On each forward stroke of the plunger or cross head 49 a transverse row of caps is delivered to the table and as each new row of caps is delivered, the same push the adjacent row of caps toward the opposite end of the table. It is highly desirable to provide means for aiding the movement of the transverse rows of caps along the table other than the cross head or plunger 49 and I have provided such a means. This means includes a reciprocating rod 74 mounted longitudinally on one side of the table 30. Any preferred means can be utilized for slidably supporting the rod and the rod has firmly secured thereto any desired number of transversely extending inverted U-shaped brackets 75. The brackets extend over and across the table and the ends of the brackets remote from the rod 74 rests on bearing blocks 76. The arms of the inverted U-shaped brackets 75 rockably support shafts 77. Adjustable pointed bearing screws 78 are provided for freely supporting the rock shafts. The rock shafts 77 have secured thereto or formed thereon depending cap engaging dogs 79. The dogs 79 extend above the shafts 77 and the dogs are provided with flat abutment faces 80 for engaging the brackets 75. The arrangement of the dogs 79 and their faces 80 is such that the dogs are free to swing with their shafts in one direction but are held against swinging movement in the opposite direction. The number of the dogs 79 correspond to the number of caps in a transverse row. Hence, during the forward operative stroke of the rod 74, the dogs engage the caps in the transverse rows and move the transverse rows along the table. On the back stroke of the rod 74, the dogs 79 ride over the caps for engaging a new row of caps. Attention is now directed to Figure 9 and it will be noted that when the back stroke of the rod 74 occurs, the dogs ride into the caps toward the center thereof. This is to insure that the dogs will not hang up on the flanges of the caps.

The rod 74 is also operated from the main drive shaft 51 and the drive shaft has secured thereto an operating cam 81. The rod 74 is provided with a laterally extending anti-friction roller 82 for engaging the periphery of the cam and the roller is normally held in engagement with the cam by a contractile coil spring 83 which has its opposite ends connected respectively to the rod and to the table.

As the transverse rows of caps move over the table, the same are subjected to the heating means for the skirts thereof. This heating means has been shown to consist of a battery of infra-red lamps 84. The lamps are supported above the table by means of a frame 85. The lamps 84 are nested (see Figure 14) in a compact order, so that the greatest number of lamps can be accommodated in a given space.

Thus the skirts of the caps will be thoroughly

and properly heated as the same travel over the table.

As a row of caps reaches the end of the table adjacent to the capping head 18, the same ride off of the table and means is provided for reversing the position of the caps and for insuring the proper delivery of a row of caps to a transverse conveyor 86 which carries caps to the rotatable capping head 18.

The conveyor 86 is mounted below the table 30 and is supported by end pulley wheels 87. These pulley wheels are rotatably mounted in a supporting frame 88, which is in turn supported from an appropriate part of the frame of my attachment A. One shaft 89 of one of the pulleys 87 is extended beyond the frame 88 and has keyed or otherwise secured thereto a pulley wheel 90. This pulley wheel 90 is driven by a pulley belt 91 which is driven from a desired part of the capping machine C. In the present instance I have shown the belt 91 driven from a pulley wheel 92 keyed or otherwise secured to a shaft 93 and this shaft 93 is in turn driven by intermeshing gears 94 from the shaft 20 of the capping machine C and this shaft is employed for driving the star wheel (not shown) for feeding the bottles in correct time to the crowning head 18. Thus the various parts of my bottle cap feeding attachment A are driven in proper timed relation to the operating parts of the crowner C.

The conveyer belt 86 extends to the cap receiving station of the crowning head 18 and between the belt and the station is a small guide tube 95 for insuring the proper delivery of the caps to the individual crowning heads. An idler 96 can be provided for engaging the caps or crowns on the conveyor belt 86 as the caps or crowns reach the guide tube and this idler functions to hold the caps or crowns down flat on the conveyor belt.

As heretofore stated, the caps or crowns are pushed off the table toward the belt 86 one transverse row at a time and to insure the delivery of one row of caps or crowns at a time to the conveyor belt 86 with the top walls of the caps or crowns upper-most, I provide a timing paddle wheel 97. This timing paddle wheel includes end plates or discs 98 connected together by blades 99. These blades are arranged at quarters and the end walls or discs 98 are keyed or otherwise secured to a rotatable shaft 100. This shaft is rotatably mounted in suitable bearings 101 carried by the side walls of the frame for the table 30. As is clearly shown in Figure 10, the paddle wheel is positioned below the table 30 and adjacent to the discharge end thereof. This discharge end of the table is provided with a depending inclined guide skirt 102 for the caps and the skirt is disposed directly in front of the paddle wheel. The frame of the table 30 also carries an end guide wall 103 and this guide wall 103 curves downwardly and inwardly over the conveyor belt 86. The guide skirt 102 inclines downwardly toward the wall 103. As a row of caps rides down the guide skirt 102, they strike the curved portion of the wall 103 and the row of caps are guided toward the conveyor belt 86. As a row of caps reaches the end of the guide wall the same are held against riding on the conveyor belt until the desired time by one of the paddle blades 99. The paddle wheel is turned a quarter of a revolution at certain definite periods, by means which will be described. But it can be seen that when the paddle wheel is turned a quarter of a revolution a paddle blade will move down and push the row of caps or crowns on the conveyor belt. This provides a positive feed of one row of crowns or caps at a time to the conveyor belt.

The means of turning the paddle wheel 97 includes the reciprocating rod 74 and this rod is provided with a depending operating head 104 which receives an anti-friction roller 105 carried by the outer end of an operating crank 106. This crank 106 is mounted for free swinging movement on a sleeve 107 which is secured to the paddle wheel shaft 100. Formed on the sleeve or secured thereto is a ratchet wheel 108 and the wheel has pivotally mounted thereon a dog 109 for operative engagement with the ratchet wheel. This wheel is provided with four teeth and upon forward movement of the rod 74 toward the guide skirt 103, the crank 106 will be moved in a counterclockwise direction (see Figure 11) and the dog 109 with the crank will move the paddle wheel a quarter of a revolution. A stop pin 110 is carried by the crank 106 to limit the swinging movement of the dog 109 in one direction, namely, on the forward push of the rod 74. On the backward stroke of the rod 74, the crank 106 will be moved in a clockwise direction a quarter of a revolution and the dog 109 will ride over the ratchet wheel so that the ratchet wheel will not turn the paddle wheel and when the dog reaches the adjacent tooth, the dog will ride into operative engagement therewith.

To prevent the accidental turning movement of the paddle wheel more than a quarter of a revolution in a clockwise direction, I provide a sliding latch bolt 111. This latch bolt is slidably mounted in suitable guides carried by the frame of my apparatus and the latch bolt is normally urged in the path of a paddle blade 99 by a contractile coil spring 112. Secured to the reciprocating rod 74 is a depending arm 113 for engagement with a right-angularly extending leg 114 formed on the latch bolt. On the rearward stroke of the rod 74, the arm 113 draws the latch bolt 111 out of the path of the paddle wheel and on the forward stroke of the rod the paddle wheel starts to turn and as the paddle blade adjacent to the latch bolt moves past the bolt, the bolt is allowed to move in toward the paddle wheel under the influence of its spring 112, and consequently the latch bolt will be in position for engaging and stopping the next paddle blade, then the latch bolt limits the movement of the paddle wheel in a counterclockwise direction.

I also provide means for preventing the accidental turning movement of the paddle wheel beyond the desired quarter of a revolution in the opposite direction. This is accomplished by securing a ratchet wheel 115 to the opposite end of the shaft 100 from the ratchet wheel 108 and this ratchet wheel 115 is provided with four teeth 116 and these teeth are adapted to be engaged by a spring pressed dog or detent 117 carried by the inner side of the frame of my attachment A. I can also provide a spring pressed ball detent 118 normally urged toward the inner face of the ratchet wheel 115 and curved indentations or seats can be provided at quarters into which the ball detent can snap. The sockets 119 are arranged at quarters on the ratchet wheel 115 at the appropriate points and the ball detent functions to hold the paddle wheel and its plate in the exact desired point relative to the conveyor belt 86 and the guide wall 103.

From the foregoing description it can be seen that I have provided an attachment for effectively delivering rows of caps to the crowner C at

the rate that they are being used and that I have provided an elongated table for the caps to insure the proper heating of the skirts thereof. While it is believed that the operation of the machine is clear from the detailed description thereof, it is to be noted that the caps are received from the hopper 15 of the crowner C and are delivered to the far end of the table 30 by the endless conveyor 33. This conveyor 33 has operating in conjunction therewith the transverse conveyor 43 and a row of caps at a time are pushed off of the conveyor 43 by the reciprocating cross head 49. The cross head moves the caps longitudinally along the table 30 one row at a time on each forward stroke thereof and operating in conjunction with the cross head to insure the proper advancement of the rows of caps with the skirts uppermost are the swinging dogs 79. As the rows of caps reach the inner end of the table, the same fall off and are guided to the delivery conveyor belt 86 by the inclined guide skirt 102 and the curved guide wall 103. The guide skirt and the guide wall reverse the position of the caps and the paddle wheel 98 functions to deliver one row of caps at a time to the delivery belt 86. These caps are then fed to the individual crowning heads 19 by the delivery belt 86. As heretofore brought out, the number of caps in each row correspond to the number of individual crowning heads 19.

While I have stated that the skirts of the caps are heated by the battery of infrared lamps 84, I can provide other heating means therefor. As in my pending case, the top walls of the caps are protected from the heat of the battery of infrared lamps by the cork or other sealing discs of the caps themselves and the table itself is provided with the heavy sheet of insulation 81.

If desired, the table 30 can be provided with longitudinally extending spaced parallel partition walls 120 and these walls extend substantially from one end of the table to the other. The walls function to keep the caps in proper longitudinal alignment.

Various changes in details may be made without departing from the spirit or the scope of my invention, but what I claim as new is:

1. In a machine for crowning bottles with plastic crown caps of the type having, a rotary crowning head casing provided with a plurality of crowning heads; an elongated flat table disposed in front of the casing, means for supplying transverse rows of plastic crown caps to one end of the table, means for feeding the transverse rows of the caps along the table, means for heating the skirts of the caps to a moldable condition as the same move along the table, and means for receiving one row of heated caps at a time from the table for delivering the same to the heads.

2. In a machine for crowning bottles with plastic crown caps of the type having, a rotary crowning head casing provided with a plurality of crowning heads, an elongated flat table disposed in front of the casing, means for supplying transverse rows of plastic crown caps to one end of the table, means for feeding the transverse rows of the caps along the table, means for heating the skirts of the caps to a moldable condition as the same move along the table, and means for receiving one row of heated caps at a time from the table for delivering the same to the heads, the number of caps in each transverse row corresponding to the number of crowning heads.

3. In a machine for crowning bottles with plastic caps, an elongated table, a cap conveyor belt arranged at one end of the belt and extending transversely thereof, means for pushing transverse rows of caps off of the belt onto the table and for feeding the caps along the length of the table, means for receiving and delivering transverse rows of caps from the table to the crowner, and means for heating the skirts of the caps to a moldable condition as the same are fed along the table.

4. In a machine for crowning bottles with plastic crown caps of the type having, a crowning head casing having a plurality of crowning heads; a flat elongated feed table for plastic crown caps arranged in front of the crowning head casing, means for delivering transverse rows of caps with their skirts upper-most on the table to one end thereof, means for feeding the transverse rows of caps from the mentioned end of the table to the opposite end thereof, means for heating the skirts of the caps to a moldable condition as the caps are fed along the table, and means for reversing the position of the caps and for delivering the caps to the crowning heads.

5. In a machine for crowning bottles with plastic crown caps of the type having, a crowning head casing having a plurality of crowning heads, a flat elongated feed table disposed in front of the crowning head casing with one end terminating adjacent the crowning cap receiving station of said casing, means for delivering transverse rows of plastic crown caps to the opposite end of the table with their skirts upper-most, means for feeding the transverse rows of caps along the table in a step by step motion toward the first mentioned end thereof, heating means for the skirts of the caps carried by the table whereby said skirts will become heated to a moldable condition as the same travel along said table, a conveyor for receiving transverse rows of caps from the last mentioned end of the table and for delivering the caps to the crowning heads, and means for placing the rows of caps from the table on said belt in a reversed position with their skirts lower-most.

6. In a machine for crowning bottles with plastic crown caps of the type having, a crowning head casing having a plurality of crowning heads; means for delivering caps to the crowning heads operated in proper timed relation from the machine, an elongated feed table for caps having one end terminating above said means, means driven from said machine for delivering transverse rows of caps to the end of the table remote from the mentioned end thereof, means for feeding the transverse rows of caps in a step by step movement along the length of the table toward said first mentioned end, means for heating the skirts of the caps to a moldable condition during their movement along the table and means for delivering one row of caps at a time from the table to the cap feeding means for the crowning heads.

7. In a machine for crowning bottles with plastic caps of the type having, a rotary crowning head having a plurality of individual crowning heads; a conveyor belt for feeding plastic crown caps to the crowning head driven from the machine, an elongated flat cap receiving table having its inner end disposed above said belt, a cap delivery belt extending transversely across the outer end of the table, a reciprocating cross head movable over said delivery belt for pushing a row of caps at a time on the table, means operating in conjunction with said reciprocating head for

advancing the caps in a step by step movement from the outer end of the table to the inner end of the table, means for heating the skirts of the caps to a moldable condition as the same move along the table, and means receiving one row of caps at a time from the inner end of the table for placing the same on the conveyor cap feeding belt for the crowning heads.

8. In a machine for crowning bottles with plastic crown caps of the type having, a hopper for the caps, a rotary crowning head casing provided with a plurality of crowning heads; a feed table disposed below the hopper and having its inner end disposed adjacent the crowning casing, means for delivering caps in transverse rows with their skirts upper-most to the outer end of the table, means for advancing the transverse rows of caps in a step by step movement from the outer end of the table to the inner end of the table, a conveyor disposed below the inner end of the table for feeding caps to the crowning heads, and means including a paddle wheel for delivering one transverse row of caps at a time from the table to the belt with their skirts lower-most.

9. In a machine for crowning bottles with plastic crown caps of the type having, a hopper for the caps, a rotary crowning head casing having a plurality of crowning heads; a flat feed table for caps extending below the hopper and having its inner end terminating adjacent the feed station for caps to the crowning heads, a conveyor belt disposed below the inner end of the table for receiving caps from the table and for delivering the caps to the crowning heads, means for delivering caps from the hopper to the outer end of the table, said means including a reciprocating head for pushing rows of caps on the table, means operating in conjunction with the head for moving the caps in a step by step movement from the outer end of the table to the inner end of the table, means for heating the skirts of the caps to a moldable condition during their travel over the table, means for receiving caps from the table and for depositing one row of caps at a time on the means for feeding caps to the crowning heads, and drive means for actuating all of the moving parts in proper timed relation relative to one another and to the rotary crowning head.

10. In a machine for crowning bottles with plastic caps of the type having a hopper for crowning caps and a rotary crowning head casing having a plurality of crowning heads; means for delivering preheated caps to the crowning heads including a flat elongated table, a conveyor extending longitudinally of the table for receiving caps from the hopper, a transverse conveyor arranged at the outer end of the table for receiving caps from the first conveyor, means including a reciprocating head movable over the transverse conveyor for pushing a row of caps off of the transverse conveyor onto the table, a second transverse conveyor arranged below the inner end of the table for delivering caps to the crowning heads, means for heating the skirts of the caps to a moldable condition as the same move along the table, and means for delivering one row of caps at a time from the inner end of the table to the second conveyor.

11. A device for feeding preheated plastic caps to a bottle crowning machine comprising a flat receiving table for the caps, means at one end of the table for delivering transverse rows of caps to the table, means at the opposite end of the table for receiving caps therefrom and for delivering the caps to the crowning machine, and means for depositing one row of caps at a time to the cap delivery means for the crowning machine arranged between the table and said last mentioned means including a rotatable paddle wheel gate having a plurality of blades for engaging the caps, and means for turning the gate in a step by step movement the distance equivalent to the spacing between the blades.

12. A device for feeding preheated plastic caps to a bottle crowning machine comprising an elongated flat delivery table, means for feeding transverse rows of caps with their skirts upper-most to one end of the table, means for receiving transverse rows of caps from the opposite end of the table for delivery to the crowning machine, means for advancing rows of caps in a step by step movement from one end of the table to the other, a rotatable paddle wheel gate arranged between the table and the means for receiving caps from the table for insuring the delivery of one row of caps at a time from the table to said cap receiving means, and means for turning the gate in a step by step movement from said cap advancing means.

13. A device for feeding preheated plastic caps to a bottle crowning machine comprising an elongated flat table, a conveyor belt for caps extending transversely across the table at one end, a reciprocating cross head for moving caps in transverse rows off of the conveyor onto the table, means cooperating with said cross head for advancing the transverse rows of caps along the length of the table including a reciprocative rod extending alongside of the table, brackets connected with said rod extending transversely across the table, and swinging dogs carried thereby for engaging the caps on one stroke of the rod.

14. A device for feeding preheated plastic caps to a bottle crowning machine comprising a flat table arranged in front of the machine, a conveyor belt arranged at the forward end of the table, means for supplying caps to the conveyor belt, a drive shaft, a reciprocating cross head movable over the belt for pushing caps off of said belt in transverse rows to the table, means for operating the cross head from the drive shaft, means at the inner end of the table for delivering caps in a reverse position with the skirts lower-most from the table to the crowning machine, a reciprocating rod extending longitudinally of the table, a plurality of spaced brackets carried by the rod extending across the table, a set of depending dogs pivotally carried by each bracket for engaging and pushing transverse rows of the caps upon movement of the rod toward the inner end of the table, said dogs being freely movable over the caps upon movement of the rod in the opposite direction, and means for reciprocating the rod from the shaft.

15. A device for feeding preheated plastic caps to a bottle crowning machine comprising a flat receiving table for the caps, means at one end of the table for delivering transverse rows of caps to the table, means at the opposite end of the table for receiving caps therefrom and for delivering the caps to the crowning machine, and means for depositing one row of caps at a time to the cap delivery means for the crowning machine arranged between the table and said last mentioned means including a rotatable paddle wheel gate having a plurality of blades for engaging the caps, and means for turning the gate in a step by step movement the distance equivalent to the spacing between the blades,

and releasable latching means for holding the gate against accidental movement.

16. A device for feeding preheated plastic caps to a bottle crowning machine comprising a flat receiving table for the caps, means at one end of the table for delivering transverse rows of caps to the table, means at the opposite end of the table for receiving caps therefrom and for delivering the caps to the crowning machine, and means for depositing one row of caps at a time to the cap delivery means for the crowning machine arranged between the table and said last mentioned means including a rotatable paddle wheel gate having a plurality of blades for engaging the caps, and mean for turning the gate in a step by step movement the distance equivalent to the spacing between the blades, and releasable latching means for holding the gate against accidental movement, said last mentioned means including a bolt disposed in the path of the blades.

17. In a machine for crowning bottles with plastic caps of the type having a hopper for crowning caps and a rotary crowning head casing having a plurality of crowning heads; means for delivering preheated caps to the crowning heads including a flat elongated table, a conveyor extending longitudinally of the table for receiving caps from the hopper, a transverse conveyor arranged at the outer end of the table for receiving caps from the first conveyor, means including a reciprocating head movable over the transverse conveyor for pushing a row of caps off of the transverse conveyor on to the table, a second transverse conveyor arranged below the inner end of the table for delivering caps to the crowning heads, and means for delivering one row of caps at a time from the inner end of the table to the second conveyor with the skirts of the caps arranged lower-most including a rotatable paddle wheel gate disposed between the inner end of the table and said second transverse conveyor including a plurality of blades, means for turning the gate in a step by step movement whereby one blade at a time will move past said second conveyor and whereby when the gate is at rest one blade will be arranged in front of the second conveyor, releasable latching means arranged in the path of the blades in proper position relative to the second conveyor when the gate is at rest, and additional means for preventing turning of the gate in a direction opposite to its normal path of rotation.

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