July 27, 1943. C. W. GOODWIN ET AL 2,325,050

CAP FEED AND HEATING APPARATUS

Original Filed June 23, 1941 3 Sheets-Sheet 1

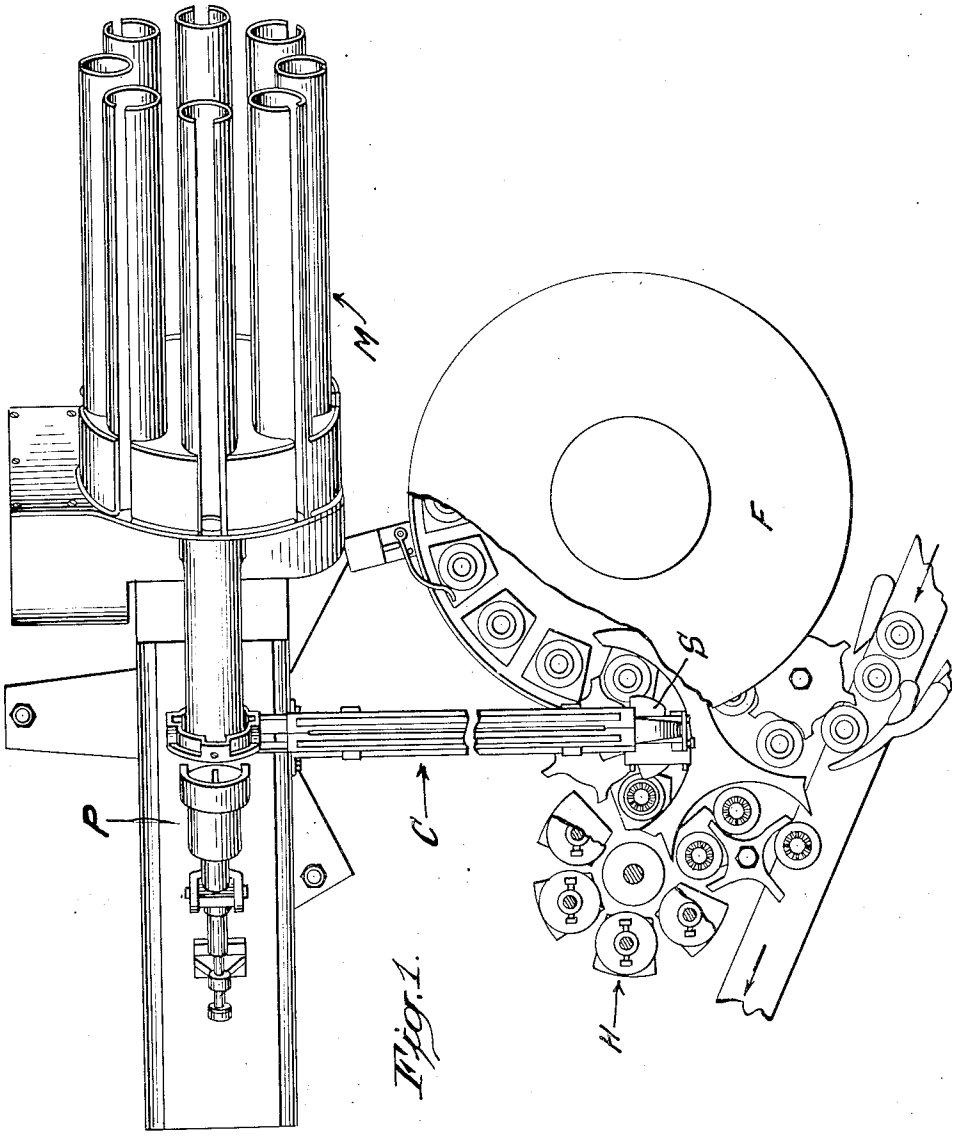


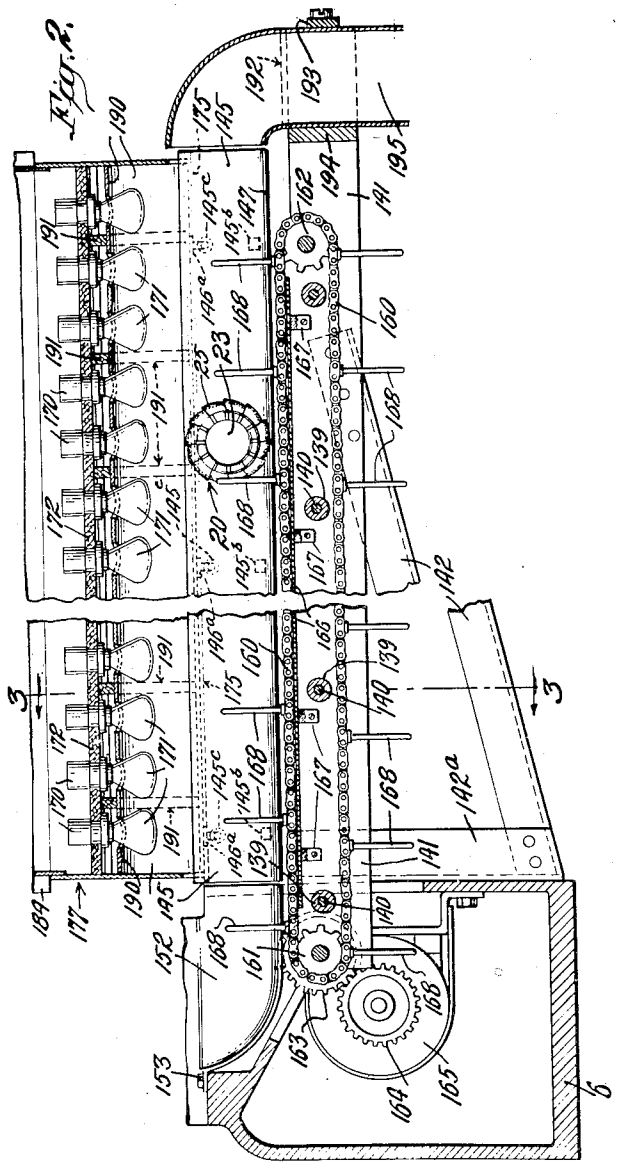
Fig. 1.

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CAP FEED AND HEATING APPARATUS

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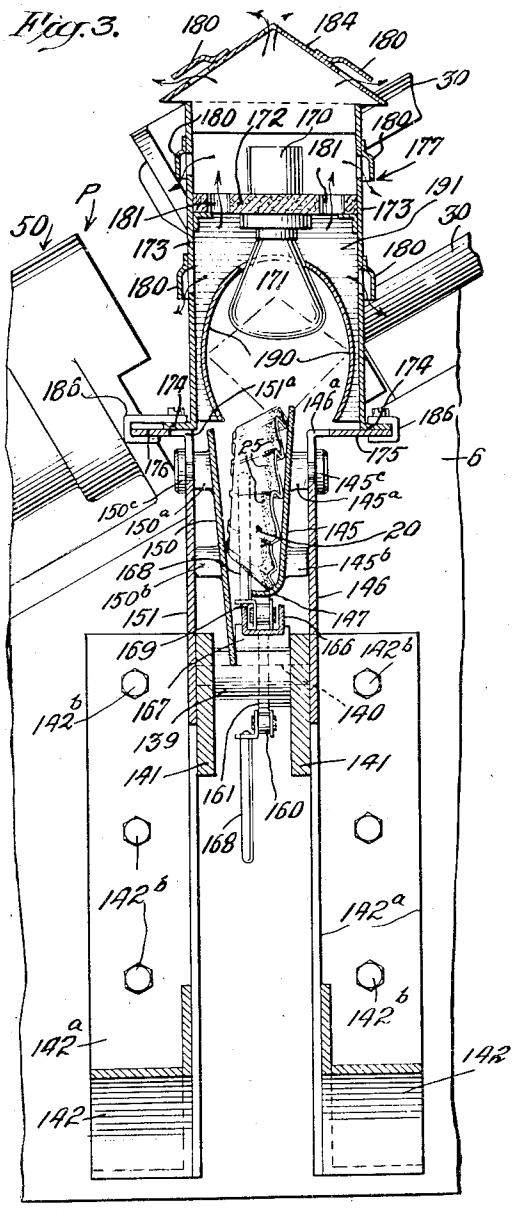
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CAP FEED AND HEATING APPARATUS

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Fig. 3.



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CAP FEED AND HEATING APPARATUS

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Original application June 23, 1941, Serial No. 399,280. Divided and this application August 26, 1941, Serial No. 408,306

10 Claims. (Cl. 219—34)

This invention relates to a machine for applying flexible skirted hood caps to milk bottles or the like and more particularly to a machine for applying and sealing caps of the above type having a pleated skirt coated in whole or in part with a thermoplastic adhesive which requires heat and pressure for sealing.

This application is a division of the copending application of Goodwin and Martin, Ser. 399,280, filed June 23, 1941, for Capping machine.

An object of the invention is to provide a mechanism of the above type having novel and improved details of construction and features of operation.

Another object is to provide a novel and improved mechanism of the above type having characteristics suited for commercial operation.

Another object is to provide novel and improved heating means suited to heat to a softening temperature the adhesive carried on the skirts of the caps.

Another object is to provide heating means for the purpose above indicated which is adapted to heat the thermoplastic adhesive without heating the skirt or the material of the cap itself to any substantial degree.

Another object is to provide a heating mechanism of the type above indicated which may be readily disassembled for cleaning.

Another object is to provide a heating mechanism of the above type in which the heating is accomplished by focused radiant heat rays.

Another object is to provide a heating mechanism of the above type in which the source of heat may be instantly interrupted upon stoppage of the mechanism, whereby danger of overheating of the cap is eliminated.

Another object is to provide a heating mechanism of the above type which is ready for instant use when the machine is connected for operation.

Various other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

Although the novel features which are believed to be characteristic of this invention are pointed out more particularly in the claims appended hereto, the invention itself may be better understood by referring to the following description, taken in connection with the accompanying drawings forming a part thereof in which a specific embodiment of the invention has been set forth for purposes of illustration.

In the drawings,

Fig. 1 is a top plan view of a cap applying and sealing mechanism embodying the present invention;

Fig. 2 is a longitudinal section through the feed chute and lamp housing; and

Fig. 3 is a transverse section on the line 3—3 of Fig. 2.

In the following description and in the claims certain specific terms have been used for convenience in referring to various details of the invention. These terms, however, are to be given as broad an interpretation as the state of the art will permit.

Referring to the drawings more in detail, the invention is shown in Fig. 1 as applied to a capping and sealing mechanism comprising magazine M having a plurality of tubes adapted to contain a plurality of stacks of nested caps for successive application to milk bottles, a picker mechanism P, which is adapted to pick successive caps from said stacks and supply them to a chute C along which the caps roll on the lower edges of their flared skirts in the path of radiant heat rays which are focused onto the adhesive carried by the skirt. From the chute C the caps pass to a cap applying station S where they meet and are picked off by the advancing necks of milk bottles and are carried to a bank of rotating capping heads H which contract the skirts around the necks of the bottles and hold the same under sealing pressure.

The milk bottles are received by a suitable conveyor, passed through a filling device F of standard construction wherein they are filled with milk, thence past the cap applying station S and to the capping heads H above mentioned, after which they are redelivered to the conveyor. The filling station F and the capping heads H form a part of the standard filling and capping apparatus, the details of which form no part of the present invention. The capping heads H may, for example, be of the form disclosed in a copending application, Goodwin and Martin, Ser. 383,752, for Capping head. The capping head is particularly designed to fold and seal caps of the type referred to herein. It is to be understood, however, that other types of caps may be used if desired.

The magazine M, picker P and chute C, in accordance with the present invention, are formed as a unit mounted on a suitable pedestal which may be positioned to supply caps with heat softened adhesive to the milk bottle heads as they advance from the filler F to the capping heads H on a standard filling and capping machine as above mentioned. These mechanisms are de-

scribed more in detail in application 399,280 referred to above. This application relates specifically to the chute C and heating apparatus.

Feed chute

The feed mechanism, as shown more in detail in Figs. 2 and 3, comprises a pair of transverse brackets 141 secured in spaced relationship by pins 140 and spacing sleeves 139. The brackets 141 are shown as attached to the bracket 6 and supported by inclined bracing members 142 and vertical struts 142a forming a cantilever truss. The vertical struts 142a are secured to the bracket by bolts 142b. A back plate 146 and a front plate 151 (Fig. 3) are secured by suitable means, as by welding, to the brackets 141 and are formed with top horizontal flanges 175 and 176 respectively.

A horizontal cap feed plate 145 is mounted in a slightly inclined position on a back plate 146 and is provided with a bottom lip 147, which is adapted to support the bottom edge of the cap skirt as the cap is rolled along the plate 145 by the means to be described. A guide plate 150 is spaced from the plate 145 to hold the cap in proper position thereon. The plate 150 is mounted in an inclined position on the front plate 151 so as to engage only the lower edge of the pouring lip housing 22 of the cap.

The feed plate 145 and the guide plate 150 are mounted by any suitable means on the back plate 146 and the front plate 151 respectively, and are preferably arranged so as to be readily removable therefrom to permit convenient dis-assembling and cleaning of the equipment. In the embodiment shown, the plates 145 and 150 are provided with positioning lugs 145a, 145b and 150a, 150b, respectively which rest against the inner surfaces of the plates 146 and 151. The lugs 145a and 150a carry pins 145c and 150c which are provided with enlarged heads and removably seat in bayonet slots 146a and 151a in the plates 146 and 151. The lugs 145b and 150b may be extended downwardly to rest on the brackets 141 if desired. Obviously, the lugs 145a and 145b and the corresponding lugs 150a and 150b may be extended downwardly to rest on the brackets 141 if desired. Obviously, the lugs 145a and 145b and the corresponding lugs 150a and 150b may be formed as single elongated lugs attached to the backs of plates 145 and 150 at convenient intervals and as many of such lugs as required may be spaced along said plates.

A guide plate 152 may be attached to the bracket 6 by screws 153 in a position to receive caps from the picker mechanism P and feed the same to the feed plate 145.

For advancing the caps on the feed plate 145, a chain 160 is provided which passes around sprockets 161 and 162, rotatably mounted between the brackets 141. The sprocket 161 is shown as attached to a gear wheel 163 meshing with a gear 164 driven by an electric motor 165 positioned within the bracket 6. The chain 160 may, however, be driven in any other convenient manner.

The chain 160 carries a series of pins 168 which extend upwardly between the guide plate 150 and the feed plate 145 in a position to engage the cap 20 on the feed plate 145. The pins 168 extend upwardly only a slight distance above the center line of said caps and terminate well beneath the level of the top edges of the skirts for the reasons to be pointed out.

The chain 160 runs in and is supported by a removable channel 166 which rests upon a series of brackets 167 attached to the back bracket 141. The channel 166 is provided with a front lip 169 on which the bottoms of the pins 168 ride. The bottom lip 147 of the feed plate 146 contacts with the side of the pins 168 so that the pins are positioned and guided by the lips 147 and 169 as they advance. The guide plate 150 preferably extends downwardly past the top of the front bracket 141 to prevent a displaced cap from catching thereon and clogging the chute.

The advancing pins 168 cause the caps which are received from the guide plate 152 to roll along the feed plate 145 to the discharge end thereof on the lower edges of their skirts. During this operation, the lower edges of the skirts of the caps rest upon the lip 147 of the plate 145 and the caps are slightly inclined rearwardly so as to rest against the face of the plate 145. In this way a minimum of friction is presented to the rolling movement of the caps and the caps are advanced at a uniform speed by the pins 168 as above mentioned.

The caps are discharged from the plate 145 into a vertical delivery chute 195, wherein they drop to the applying station S. The chute 195 may be secured between the brackets 141 and against a cross bar 194 by a pivoted latch bar 193, and may be provided with a positioning lip 192 which rests on one of the brackets 141. The chute 195 may thus be removed by lifting the latch bar 193 and sliding the chute from the frame formed by the ends of the brackets 141 and the cross bar 194.

Heating means

For heating the band of adhesive 25 on the lower edges of the outer surfaces of the skirts 23 of the caps 20 as they roll along the feed plate 145, there is provided a radiant heating means comprising a row of incandescent lamps 171 of the type emitting heat rays from a concentrated source or filament. The lamps 171 are shown as mounted in sockets 170 carried on a base 172 which is mounted between front and back walls 173 of a lamp housing 177. The walls 173 are formed with bottom flanges 174, which are adapted to rest on and be clamped to the flanges 175 and 176 of the plates 146 and 151 by suitable means shown as clips 186. The flanges 175 and 176 may, however, be extended around the flanges 174 to form channels to receive the same, in which case the clip 186 may be omitted. The lamp housing may thus be removed or assembled by sliding the same longitudinally over the flanges 175 and 176.

The lamp housing 177 may be closed by a hood 184 which may be formed integral with the side walls 173. The side walls 173 and hood 184 are shown as provided with louvers 180 to permit the heated air to escape and the base 172 is provided with apertures 181 to permit free flow of heated air upwardly for the above purpose.

The light housing 177 carries a reflector 190, which is attached to the side walls 173 by suitable means such as asbestos blocks 191 which heat insulate the same from the side walls 173 and may be made substantially elliptical in section and arranged so that the filaments of the lamps 171 are located at one focus of the ellipse and bands of adhesive 25 at the top edges of the skirts of the caps 20 are located at the other focus. In this way all light rays emanating from the lamp 171 are focused directly upon the ad-

hesive 25 on the cap skirt as the latter rolls along the feed plate 145. The speed of travel of the caps is such that the adhesive is heat softened and rendered tacky by the radiant heat from the lamps 171 as they roll along the feed plate 145 without materially heating the paper or body of the skirt or of the cap itself.

The lamps 171 are preferably connected to be energized only when the motor 164 is operating. Hence, should the motor stop for any reason the lamps are likewise deenergized, thereby cutting off the source of radiant heat and preventing the caps from becoming damaged or ignited due to excessive exposure to such heat rays. The heat rays may thus be made sufficiently intense to heat soften the thermoplastic adhesive on the skirt of the moving cap without danger of injuring the cap if the feed is interrupted. Furthermore, the operation of the heating means is instantaneous, the heat being available immediately when the machine is turned on and being cut off immediately when the machine is stopped. No warming up period is required, nor is any additional protective means necessary to prevent the caps from becoming overheated.

The normal time required for feeding a cap along the plate 145 is determined in accordance with the heat requirements so that the caps are discharged with the adhesive in softened tacky condition suitable for sealing on a bottle in the manner to be described. As the caps roll along the plate 145 on the lower edge of the skirt all parts of the skirt bearing the adhesive 25 are successively brought into position to receive heat rays from the lamps 171. The rays enter the spaces between the skirt folds and soften the adhesive at the points where maximum adhesion is required.

The pins 168 terminate below the point of focus of the heat rays from the lamps 171. Hence they are not subjected to intense heat and are not required to withstand high temperatures. This also applies to the other mechanical parts which are located beyond the focus of the heat rays.

While a particular type of feed means has been shown, it is to be understood that various other means may be utilized for feeding the cap along the path of the heat rays. The feed chute may, for example, be inclined so as to feed the caps by gravity. The speed of travel of the cap will then be determined by the inclination of the chute. It is also to be understood that the radiant heating means herein disclosed may be suitable for other uses and is not restricted to the particular machine disclosed herein.

It is to be understood that the time of heating of the caps in the feed chute and the sealing time of the capping head H may be selected in accordance with the particular adhesive being used so that the adhesive is first heated to the proper temperature for softening the same and the caps are later held under pressure in the sealing head a sufficient time to allow the adhesive to set and permanently secure the folds of the skirt.

It is to be noted that heat applied to the cap is in the nature of flash heat or radiant heat and that the adhesive is heated rapidly and efficiently without heating the corresponding portion of the cap or skirt. In this way the time required for heating the adhesive is greatly reduced and at the same time the sealing time is correspondingly reduced. Inasmuch as the cap skirt is comparatively cool and the body of the cap is substantially unheated, the adhesive is cooled to a setting temperature substantially immediately by the cold milk bottle when the skirt is folded therearound in the capping head. At the speed of operation above mentioned by way of example, substantially flash heating and flash cooling is obtained. In this way, the adhesive-coated, skirted caps are applied to milk bottles and sealed thereon during the time usually required for applying discs to milk bottles in standard filling and capping machines. The cost of operation and the attention required in the dairy is accordingly not greatly increased, an important feature in the dairy industry where the margin of profit is decidedly small and the cost of capping must be kept to a minimum.

Although a specific embodiment of the invention has been shown for purposes of illustration, it is to be understood that various changes and modifications may be made therein as will be readily apparent to a person skilled in the art. Furthermore, the various features set forth above may be applied individually to other types of capping machines and for other uses and are not restricted to the specific combination disclosed. The invention is only to be limited in accordance with the scope of the following claims.

What is claimed is:

1. In a machine for applying to containers and sealing thereon partially preformed hood caps having foldable pleated skirts carrying a thermoplastic adhesive coating for securing the folds together, mechanism delivering said caps to container heads with the thermoplastic adhesive rendered tacky for sealing, said mechanism comprising a feed chute having a surface along which said caps are adapted to roll, feed means causing said caps to roll along said chute, said feed means comprising a travelling pusher means engaging said cap and advancing at a predetermined speed along said chute, an elongated radiant heat source extending along said chute, and means concentrating radiant heat from said source onto the coating on the upper edge of the skirt as the cap rolls along said chute, to thereby render the thermoplastic adhesive tacky for sealing without substantially heating the body of the cap or skirt.

2. In a machine for applying to containers and sealing thereon partially preformed hood caps having foldable pleated skirts carrying a thermoplastic adhesive coating for securing the folds together, mechanism delivering said caps to container heads with the thermoplastic adhesive rendered tacky for sealing, said mechanism comprising a feed chute having a surface along which said caps are adapted to roll, feed means causing said caps to roll along said chute, said feed means comprising a plurality of traveling pins extending transversely of said chute and engaging said cap, means causing said pins to advance at a predetermined speed, an elongated radiant heat source extending along said chute, and means concentrating radiant heat from said source onto the coating on the upper edge of the skirt as the cap rolls along said chute, to thereby render the thermoplastic adhesive tacky for sealing without substantially heating the body of the cap or skirt.

3. In a machine for applying to containers and sealing thereon partially preformed hood caps having foldable pleated skirts carrying a thermoplastic adhesive coating for securing the folds together, mechanism delivering said caps to container heads with the thermoplastic adhesive

rendered tacky for sealing, said mechanism comprising a feed chute having a surface along which said caps are adapted to roll in substantially vertical edgewise position and a plurality of travelling pins extending upwardly through said chute and advancing therealong, said pins engaging said cap, advancing at a predetermined speed to cause said caps to roll along said chute, an elongated radiant heat source extending along said chute, and means concentrating radiant heat from said source onto the coating on the upper edge of the skirt as the cap rolls along said chute, to thereby render the thermoplastic adhesive tacky for sealing without substantially heating the body of the cap or skirt.

4. In a machine for applying to containers and sealing thereon partially preformed hood caps having foldable pleated skirts carrying a thermoplastic adhesive coating for securing the folds together, mechanism delivering said caps to container heads with the thermoplastic adhesive rendered tacky for sealing, said mechanism comprising a feed chute having a surface along which said caps are adapted to roll in substantially vertical edgewise position and a plurality of travelling pins extending upwardly through said chute and advancing therealong, said pins engaging said cap and advancing at a predetermined speed to cause said caps to roll along said chute, said pins terminating short of the line of the upper edge of the skirts of the rolling caps and radiant heat means focusing radiant heat rays onto the adhesive at said upper edge of the rolling skirts under conditions to heat the same to a softening temperature without substantially heating the body of the cap or skirt and without subjecting the travelling pins to high temperatures.

5. In a machine for applying to containers and sealing thereon partially preformed hood caps having foldable pleated skirts carrying a thermoplastic adhesive coating for securing the folds together, mechanism delivering said caps to said container heads with the thermoplastic adhesive rendered tacky for sealing, said mechanism comprising a feed chute having a feed plate provided with a bottom lip along which said caps roll in substantially vertical edgewise position on the lower edges of their skirts and with their skirts extending toward said feed plate, a guide plate opposite said feed plate and adapted to engage the top of said cap for holding the same in position on said feed plate, a plurality of travelling pins extending upwardly between said feed plate and said guide plate to engage said caps for causing the same to roll along said feed plate, an elongated radiant heat source extending along said chute, and means concentrating radiant heat from said source onto the coating on the upper edge of the skirt as the cap rolls along said chute, to thereby render the thermoplastic adhesive tacky for sealing without substantially heating the body of the cap or skirt.

6. In a machine for applying to containers and sealing thereon partially preformed hood caps having foldable pleated skirts carrying a thermoplastic adhesive coating for securing the folds together, mechanism delivering said caps to said container heads with the thermoplastic adhesive rendered tacky for sealing, said mechanism comprising a feed chute having a feed plate provided with a bottom lip along which said caps roll in substantially vertical edgewise position on the lower edges of their skirts and wtih their skirts extending toward said feed plate, a guide plate opposite said feed plate and adapted to engage the top of said cap for holding the same in position on said feed plate, a plurality of travelling pins extending upwardly between said feed plate and said guide plate to engage said caps for causing the same to roll along said feed plate, said lip engaging said pins to position the same as they advance along said feed plate, an elongated radiant heat source extending along said chute, and means concentrating radiant heat from said source onto the coating on the upper edge of the skirt as the cap rolls along said chute, to thereby render the thermoplastic adhesive tacky for sealing without substantially heating the body of the cap or skirt.

7. In a machine for applying to containers and sealing thereon partially preformed hood caps having foldable pleated skirts carrying a thermoplastic adhesive coating for securing the folds together, mechanism delivering said caps to said container heads with the thermoplastic adhesive rendered tacky for sealing, said mechanism comprising a feed chute having a feed plate provided with a bottom lip along which said caps roll in substantially vertical edgewise position on the lower edges of their skirts and with their skirts extending toward said feed plate, a guide plate opposite said feed plate and adapted to engage the top of said cap for holding the same in position on said feed plate, a plurality of travelling pins extending upwardly between said feed plate and said guide plate to engage said caps for causing the same to roll along said feed plate, an endless conveyor chain carrying said pins in overhanging relationship on the side thereof, a channel member supporting said chain, and having a lip extending upwardly to engage the bottom of said chain for guiding the same, the lip on said feed plate engaging the sides of said pins for positioning the same as they advance along said chute, an elongated radiant heat source extending along said chute, and means concentrating radiant heat from said source onto the coating on the upper edge of the skirt as the cap rolls along said chute, to thereby render the thermoplastic adhesive tacky for sealing without substantially heating the body of the cap or skirt.

8. In a machine for applying to containers and sealing thereon partially preformed hood caps having foldable pleated skirts carrying a thermoplastic adhesive coating for securing the folds together, mechanism delivering said caps to container heads with the thermoplastic adhesive rendered tacky for sealing, said mechanism comprising a feed chute, said feed chute comprising a pair of side plates extending longitudinally thereof and having outwardly extending top horizontal flanges, a cap feed plate and a cap guide plate removably mounted on the respective side plates and adapted to receive and guide a cap for rolling along said feed plate in vertical edgewise position on the lower edge of its skirt, radiant heat means for applying heat to the adhesive on the upper edge of said skirt as the caps roll along said feed plate, said radiant heat means comprising a lamp housing slidably mounted on said horizontal flanges whereby said lamp housing may be removed longitudinally of said side plates.

9. In a machine for applying to containers and sealing thereon partially preformed hood caps having foldable pleated skirts carrying a thermoplastic adhesive coating for securing the folds together, mechanism delivering said caps to container heads with the thermoplastic adhesive

rendered tacky for sealing, said mechanism comprising a feed chute, said feed chute comprising a pair of side plates extending longitudinally thereof and having outwardly extending top horizontal flanges, a cap feed plate and a cap guide plate removably mounted on the respective side plates and adapted to receive and guide a cap for rolling along said feed plate in vertical edgewise position on the lower edge of its skirt, radiant heat means for applying heat to the adhesive on the upper edge of said skirt as the caps roll along said feed plate, said radiant heat means comprising a lamp housing slidably mounted on said horizontal flanges whereby said lamp housing may be removed longitudinally of said side plates, a conveyor chain carrying a plurality of pins, said pins extending upwardly between said feed plate and said guide plate to engage said caps and cause the same to roll along said feed plate, a removable channel member in which said chain rides, said channel member having an upstanding lip engaging said pins for positioning the same.

10. In a machine for applying to containers and sealing thereon partially preformed hood caps having foldable pleated skirts carrying a thermoplastic adhesive coating for securing the folds together, mechanism delivering said caps to container heads with the thermoplastic adhesive rendered tacky for sealing, said mechanism comprising a feed chute, said feed chute comprising a pair of side plates extending longitudinally thereof and having outwardly extending top horizontal flanges, a cap feed plate and a cap guide plate removably mounted on the respective side plates and adapted to receive and guide a cap for rolling along said feed plate in vertical edgewise position on the lower edge of its skirt, radiant heat means for applying heat to the adhesive on the upper edge of said skirt as the caps roll along said feed plate, said radiant heat means comprising a lamp housing slidably mounted on said horizontal flanges whereby said lamp housing may be removed longitudinally of said side plates, a conveyor chain carrying a plurality of pins, said pins extending upwardly between said feed plate and said guide plate to engage said caps and cause the same to roll along said feed plate, a removable channel member in which said chain rides, said channel member having an upstanding lip and said feed plate having a horizontally extending lip, said lips being adapted to engage and position said pins as said pins advance along said chute.

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