

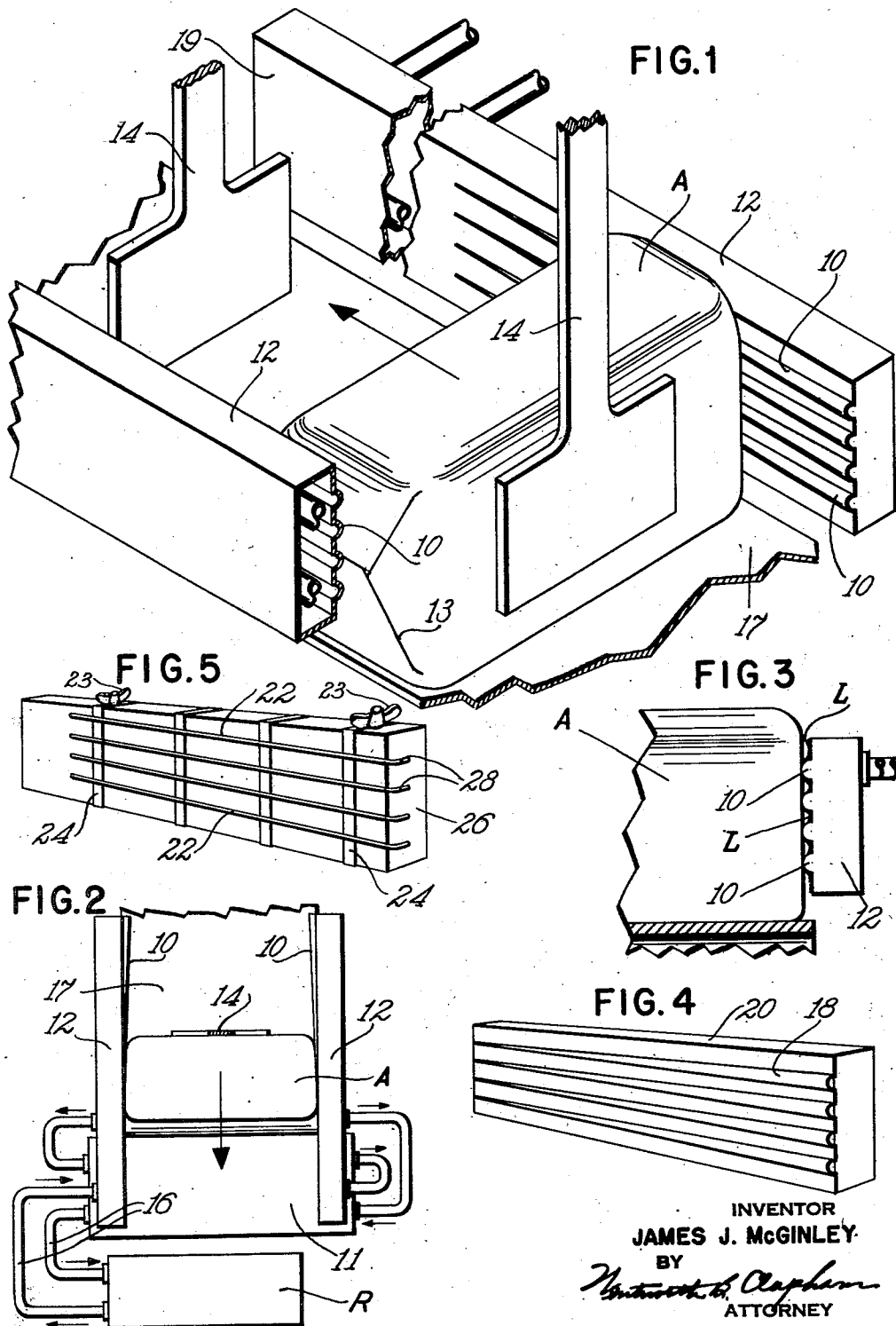
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J. J. MCGINLEY

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HOT SEAL COOLING MECHANISM

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HOT SEAL COOLING MECHANISM

James J. McGinley, Williston Park, N. Y., assignor to American Machine & Foundry Company, a corporation of New Jersey

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This invention relates to improvements in hot seal cooling apparatus for wrapping machines, and more particularly to mechanism which operates upon the hot seals of packages enclosed with wrappers having thermoplastic sealing coatings such that as packages leave the heat sealing devices of a wrapping machine, the hot seals thereof are cooled rapidly to solidify the heat energized coating upon the wrapping material and thereby form better, more efficient and more rugged seals.

The present invention constitutes improvements in hot seal cooling mechanisms of the type disclosed in copending McGinley et al. application, Serial Number 603,902, filed July 9, 1945, now Patent 2,563,858, granted August 14, 1952, although it can be used with other heat seal cooling mechanisms, if desired.

Hot seal cooling devices of the vacuum eutectic type have proven to be especially valuable in a hot seal cooling apparatus for wrapping machines because it is possible to maintain a substantially constant low heat dissipating temperature in each seal cooling plate or tank due to the fact that the eutectic fluid in each tank when in use is actually frozen. The freezing temperature of the eutectic fluid is determined in advance and so controlled that suitable ranges can be maintained. If, for instance, a suitable temperature range is 8° to 18° F., the eutectic is solidly frozen, a layer of frost or ice forms on the exterior of each plate or tank, and the compressor which circulates the refrigerant, such as Freon, through the coil of the refrigerating system, cuts out at 8°. When the cooling tanks or plates have absorbed sufficient heat as the result of a succession of packages having hot seals passing therebetween and thereover to melt the layer of ice formed on the exterior heat dissipating faces of the tanks or plates, and the temperature reaches 18° F., the compressor is automatically cut in and the cycle is continued in operation. The automatic control is such that a layer of ice is maintained constantly on the package engaging faces of the tanks or plates.

This arrangement increases the efficiency of the mechanism, and adds to the life of the compressor because of the provision of what can be termed a "hold-over." That is, the on and off periods of compressor operation are controlled according to the temperatures fixed by the thermostats and a hold-over layer of ice or frost on the tanks or plates results. In order to maintain a high efficiency of operation, the high of the temperature range is set to cut in the compressor before the eutectic returns to fluid state. The operating efficiency is higher because of the expenditure of less energy than would be required to convert a fluid eutectic back to frozen state.

I have found that when hot seal cooling apparatus of the type mentioned above is used in connection with high speed wrapping machines, such as employed in the high speed wrapping of loaves of bread, it is difficult to maintain a layer of ice or frost on the leading portions of the tanks or plates which are first engaged by a wrapped loaf or the like delivered from the heat sealing devices of a wrapping machine between the cooling tanks or plates. One of the prime functions of the cooling tanks or plates employed is to cool the package ends after a wrapper has been heat sealed upon the package to develop bond strength and to maintain pressure on each package until this bond strength is developed. Unless a frost or ice layer is maintained on the leading portion of each sealing face of the cold plates or tanks, the relatively high temperature of heated seals resulting from each package emerging from the heat sealing plates, where the wax or other thermoplastic coating is melted or energized, tends to melt the ice at the leading portion of the plates or tanks and prevents the desired operation of the cooling mechanism. Even if the refrigeration units are increased in capacity to cool the hot seals of the

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package ends, it is practically impossible to maintain the desired ice film or layer on the leading portions of the seal engaging portions of the tanks.

In accordance with the invention, the faces of the hot seal cooling mechanism tanks or plates are provided with a plurality of grids, ribs, or vanes. These vanes are formed or arranged in substantially horizontal arrangement on the face of each tank or plate, and may be stamped out, or consist of rods which are secured to the face of the tank in any desired manner. These vanes or ribs prevent the entire end surface of each package from coming directly in contact with the leading or entry portion of the cooling faces of the hot seal cooling plates or tanks as they enter therebetween. Therefore, the effective contact area between the hot end seals of a package and the faces of the cooling plates or tanks is greatly reduced. This not only permits the formation of ice on the tanks or plates between the ribs or vanes, but also prevents the melting of such ice layer or film at the leading portion of the tanks or plates. In this way, as each hot seal of a package travels between the hot seal cooling plates or tanks, there is a gradual effective transfer of heat until the package moves off the vanes or ribs at some point along the path of its travel between the tanks or plates, the partly cooled end seals are brought into direct contact with the face of the plates or tanks and the layer of ice thereon, and the cooling operation is completed. In this way the leading portion of each tank or plate does not take the entire cooling load. The entire length of each tank plays an active part in cooling the seals, and hence the dissipation of heat is substantially constant throughout the entire length of the cooling face of each plate or tank.

It is an object of the invention to provide an improved hot seal cooling apparatus for use with wrapping machines having spaced hot seal cooling plates or tanks which are formed with a plurality of spaced substantially horizontal ribs or vanes operative to prevent the removal of an ice layer or film from the leading portion of a plate or tank as the result of packages with hot end seals moving therebetween.

It is also an object of the invention to provide an improved hot seal cooling apparatus having means for dissipating heat without complete melting of a layer of ice or ice film formed on the plates or tanks, especially upon the leading portion thereof.

The invention also consists in improved hot seal cooling mechanism having elongated cooling members which are provided with a plurality of vertically spaced, longitudinally extending tapered ribs which operate to create a varying barrier for the transfer of heat.

The invention also is characterized by a hot seal cooling apparatus consisting of spaced vertical plates or tanks having cooling faces between which are moved packages having hot seals which are cooled thereby. The apparatus is provided with means for forming an ice layer or film on the seal engaging faces of the plates or tanks, each plate or tank being formed with a plurality of vertically spaced longitudinally extending tapered ribs either brazed to each face of, or formed integrally in the face of each cold plate which is engaged by the hot seals of wrapped articles passing therebetween. The tapered ribs create a varying barrier for the transfer of heat, such that at the leading portion of the cold plate where the amount of heat transmitted normally is greatest, the ribs are of maximum height and thereby provide the greatest barrier. As the ribs merge into the surface of the cold plate, there is a gradual decrease in this barrier and the cooling of each end seal is completed by the engagement of the unmodified surface of the opposed hot seal cooling plates or tanks.

The invention also consists in the improved method of cooling the hot heat sealed ends of packages by initially subjecting limited portions of the hot end seals to cooling to dissipate part of the heat in the seals and finally subjecting the entire partly cooled end seals to cooling influence to complete the cooling thereof.

With these and other objects not specifically mentioned in view, the invention consists in certain combinations and constructions which will be hereinafter fully

described, and then set forth in the claims hereunto appended.

In the accompanying drawings which form a part of this specification, and in which like characters of reference indicate the same or like parts:

Fig. 1 is an isometric view illustrating a preferred embodiment of the invention;

Fig. 2 is a plan view of the structure shown in Fig. 1 illustrating the operative relationship of the units thereof in conjunction with a refrigerating mechanism;

Fig. 3 is an end elevation of a preferred form of cooling plate or tank with the hot seal of one end of a package in contact with the leading edge of the plate or tank;

Fig. 4 is an isometric view of a modified form of cooling plate or tank constructed in accordance with the invention; and

Fig. 5 is an isometric view of another modified form of cooling plate or tank.

The hot seal cooling apparatus constituting the present invention may form an integral part of, or an adjunct to, a package wrapping machine of the type in which wrapped packages moving in succession through the wrapping machine, pass between and over heat sealing mechanisms. These mechanisms melt or activate heat sealable coatings on the wrappers, which coatings when subjected to cooling, solidify and secure firmly together the end and bottom folds of the packages being formed.

With reference to Figures 1, 2 and 3, which show a preferred embodiment of the invention, a pusher 14 which constitutes one of a series of pushers attached to and spaced equidistantly along endless suitably driven sprocket chains (not shown) of the wrapping machine conveying system (not shown), moves a package A, consisting of an article enclosed in a wrapper having a thermoplastic coating, such as waxed paper, from the folding and sealing mechanisms (not shown) of the wrapping machine between hot seal cooling plates or tanks 12. Package A is formed with end folds designated 13 which, as the result of the operations of the folders (not shown), are overlapped and folded closely against the ends of the package. As the result of being subjected to contact with the heat sealing plates (not shown) of the sealing mechanism, the thermoplastic coating is melted, and until cooled, the end folds of the package will not remain in proper folded position relative to the ends of an article, such as a loaf of bread, enclosed in the wrapper. The folding and sealing mechanisms employed may be of any conventional construction, such for example as those shown in Patent 2,563,858. Since the specific folders and sealing mechanism do not constitute a part of the present invention, further description and showing thereof are deemed unnecessary.

Each package A, upon emerging from the end fold heat sealers (not shown) and after passing over the bottom seam heat sealing plate (not shown), is moved by a pusher 14 between spaced cooling plates or tanks 12. As the result of the movement of each package through the cooling apparatus, the thermoplastic coating i. e. the melted wax in the wrapper suggested as by way of example, is solidified and the end folds are held firmly together and a satisfactory, rugged package results.

Conveyor pushers 14 are secured to spaced chains (not shown) running on driving and driven sprockets (not shown) suitably supported in the machine frame. The chains which support pushers 14 preferably are continuously driven in order to travel packages from the heat sealing mechanism (not shown) to and through the hot seal cooling apparatus constituting the invention. The conveying system may be of the same general type as that shown in Schmitt Patent 1,851,295, and since it forms no specific part of the present invention, further description thereof is considered unnecessary.

A top hold-down member, such as an endless belt (not shown), also of conventional design such as shown in the above referred to copending application, may, if desired, be provided for properly disposing the several packages A of a succession of packages passing between the hot seal cooling plates or tanks 12. This hold-down member maintains each package A upon an endless belt designated generally 17, which coacts with pushers 14 in advancing packages between the cooling faces of hot seal cooling plates 12, and onto bottom cooling plate or tank 11 where the bottom seams are cooled.

As mentioned hereinabove, it is particularly desirable that the cooling plates or tanks be provided with a film

or layer of ice L in order that the heat in the hot seals on each package may be dissipated in the shortest period of time possible, which also results in keeping the length of the hot seal cooling plates to a minimum.

In high speed operation, it has been found that it is extremely difficult to maintain an ice layer on the portion of each plate or tank 12 where the hot seals of a package first engage the plate or tank and for a portion thereof along the path of travel of each package therebetween. As indicated in Figures 1, 2 and 3, the face of each plate or tank 12 is provided with a plurality of vertically spaced longitudinal vanes or ribs 10 formed integrally therewith which engage with the hot seals of a package A as the latter enters between the plates or tanks 12. Ribs or vanes 10 at the edge of each plate or tank 12 extend outwardly as shown in Figures 1 and 3 into the path of travel of each package moving therebetween and gradually taper inwardly until, say at approximately one-third of the length of each plate or tank 12 they merge into the surface thereof. In this way, when the temperature of the thermoplastic adhesive is greatest, i. e. when the package enters between plates or tanks 12, only a limited portion of the hot seals come into direct contact with ribs or vanes 10 and the layer or film of ice L remains, as shown in Figure 3. Therefore, as each package is moved by pushers 14 and belt 17 through the hot seal cooling mechanism, due to the tapering of the vanes or ribs 10 into the face of each plate or tank 12, the hot seals are gradually cooled and brought finally into direct contact with portion 19 of each plate or tank where the final cooling operation is effected.

The hot seal cooling plates or tanks 12 may be the same in construction and arrangement as those shown in the above referred to Patent 2,563,858, wherein vacuum eutectic cooling tanks are operatively connected with a refrigerating circuit and provided with a coil containing a suitable refrigerant, such as Freon. Figure 3 discloses a schematic arrangement wherein hot seal cooling tanks or plates 12, filled with a suitable eutectic, are connected by means of suitable tubes 16 to a refrigerating system designated generally R similar in construction and design to that disclosed in the above referred to McGinley and DiPaola patent.

Plates or tanks 12 may be mounted for adjustment to and from each other in order to accommodate packages of different lengths. The adjusting mechanism (not shown) can be the same as that shown in the above mentioned patent, and since it forms no part of the present invention, no further showing thereof is made herein.

Figure 4 discloses a modified form of the invention in which the vertically spaced, longitudinally extending tapered ribs 18 may run the full length of each cold plate or tank 20. In this embodiment, the ribs consist of tapered bars or rods which are brazed or otherwise secured to the operative face of each tank 20.

In the form of the invention shown in Figure 5, a cold plate or tank 26 is provided with a plurality of spaced wires or rods 22 secured to a number of thin flat strips or bands 24 which are attached to cold plate 26 in any suitable manner as by means of screws 23. Rods 22 are provided with a curved portion 28 seated against the leading end of tank 26 substantially at right angles to the length of rods 22 in order to permit smooth entry of a package between the rods attached to cold plates 26. In the modification shown in Figures 4 and 5, a layer or film of ice is maintained between ribs 18 and rods 22, respectively, in the same manner as between ribs or vanes 10 in Figures 1, 2 and 3. The entry ends of the ribs 10 and 18 preferably are rounded in order to provide easy access of the ends of packages with hot seals therebetween. In the case of the modification shown in Figure 5 where there is no distinct taper of rods 22, the entrance ends of plates or tanks 26 may be spaced slightly farther apart than the discharge ends thereof in order to provide the effect of a taper, i. e. to provide a greater space between the tanks at the entrance than at the discharge ends thereof. As shown in Figure 5, rods 22 may be inclined upwardly from the leading edge of tank 26 on which they are mounted. This arrangement provides a wiping action upon each end seal passing therebetween and hence a tighter seal is effected. If desired, the vanes or ribs 10 and 18 in the modification shown in Figures 1 and 4 may be formed in a similar manner.

The invention above described may be varied in con-

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struction within the scope of the claims, for the particular device, selected to illustrate the invention, is but one of many possible concrete embodiments of the same. It is not, therefore, to be restricted to the precise details of the structure shown and described.

What I claim is:

1. A hot seal cooling and setting apparatus for use with a wrapping machine in which heat is applied to the seals of a wrapped article to secure the overlapped portions thereof, comprising article support means, means for forwarding wrapped articles having hot end seals along said support means, spaced refrigerated members having cooling faces mounted at opposite sides of said support means and positioned to engage said hot end seals, and a plurality of elongated ribs on said members adapted to be engaged by said hot end seals and maintain the major portion of the hot end seals out of initial contact with said cooling faces of said members, said ribs being operative to progressively dissipate the heat from said seals as said wrapped article is moved by said means between said spaced refrigerated members.

2. A hot seal cooling and setting apparatus for use with a wrapping machine in which heat is applied to the seals of a wrapped article to secure the overlapped portions thereof, comprising an article support, means for forwarding wrapped articles having hot end seals along said support, spaced refrigerated members mounted at opposite sides of said support and having cooling faces positioned to engage said hot end seals, and a plurality of substantially horizontal, vertically spaced elements on said members and projecting outwardly therefrom adapted to be engaged by said hot seals during the initial movement of said wrapped articles between said members, said elements being operative to prevent the entire area of said hot end seals from coming directly in contact with said cooling faces of said members, whereby the heat in said hot seals is progressively dissipated as said forwarding means move said wrapped articles between said members.

3. A hot seal cooling and setting apparatus for use with a wrapping machine in which heat is applied to the seals of a wrapped article to secure the overlapped portions thereof, comprising an article guideway, means for forwarding wrapped articles having hot end seals through said article guideway, said guideway including spaced refrigerated members having cooling faces positioned to engage hot end seals, and a plurality of substantially horizontal, vertically spaced, elongated ribs spaced from said members and extending longitudinally therealong for a portion of the length thereof, said ribs being adapted to maintain the entire area of said hot end seals out of initial contact with said cooling faces of said members, and said ribs being operative to progressively dissipate the heat from said seals as said means move said wrapped articles between said refrigerated members of said guideway.

4. A hot seal cooling and setting apparatus for use with a wrapping machine in which heat is applied to the seals of a wrapped article to join overlapped portions thereof, comprising an article guideway, means for moving wrapped articles having hot end seals through said article guideway, said guideway including spaced refrigerated members having cooling faces positioned to be engaged by said hot end seals, means for maintaining a layer of ice on said faces of said members, and a plurality of vertically spaced substantially horizontal ribs on said faces of said members for preventing the full area of each of said end seals from initially engaging said faces of said members.

5. The apparatus defined in claim 4, wherein said ribs are elongated elements extending from the hot seal entry end of said members along a portion of the length thereof, said ribs being adapted to keep said hot end seals out of direct contact with said layer of ice on said cooling faces during the movement of said wrapped article hot seals along said ribs, said ribs terminating short of the length of said members, whereby said faces are engaged directly by partially cooled end seals to complete the cooling and setting thereof as said wrapped article end seals are moved by said means off said ribs and into direct contact with said faces.

6. The apparatus defined in claim 4 wherein said ribs are formed in said faces and extend outwardly therefrom into the path of travel of said wrapped articles having hot end seals, said ribs being tapered inwardly from the point of engagement of a hot end seal therewith and merging

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into said cooling faces at a point along the length thereof.

7. The apparatus defined in claim 1, wherein said ribs comprise rods secured to said members and spaced from said cooling faces of said cooling members, said ribs being operative to progressively dissipate the heat from said seals as said means move said wrapped articles between said members.

8. The apparatus defined in claim 4 wherein said ribs project from said cooling faces into the path of travel of said wrapped articles, and extend along a portion of the length of said members, whereby said hot seals first engage and move along said ribs and are prevented from melting said ice layer, and then travel between said members in direct contact with said faces.

9. The apparatus defined in claim 8 wherein said ribs are tapered, said ribs project the greatest distance into the path of movement at substantially the point of entry of said wrapped article hot seals therebetween, and merge into said faces at a point between the ends of said members.

10. A hot seal cooling and setting apparatus for use with a wrapping machine in which heat is applied to the seals of a wrapped article to join overlapped portions thereof, comprising an article guideway, means for moving wrapped articles having hot end seals along a substantially straight line path of travel through said article guideway, said guideway including spaced refrigerated members having cooling faces positioned to be engaged by said hot end seals, means for maintaining a layer of ice on said faces, and a plurality of vertically spaced substantially horizontal ribs carried by said members and having hot seal engaging surfaces located in planes spaced from and extending along said faces of said members for presenting the full area of each end seal from initially engaging said faces of said members.

11. The apparatus defined in claim 10 including means for detachably mounting said ribs on said members, said means comprising supports detachably attached at spaced positions along said members.

12. The apparatus defined in claim 11 wherein said ribs are secured in substantially vertically spaced parallel relationship with the leading ends of said ribs positioned lower than the trailing ends thereof, whereby said ribs exert a wiping action upon the seals therealong.

13. A hot seal cooling and setting apparatus for use with a wrapping machine in which heat is applied to the seals of a wrapped article to join overlapped portions thereof, comprising an article guideway, means for moving wrapped articles having hot end seals along a substantially straight line path of travel through said article guideway, said guideway including spaced refrigerated members having cooling faces positioned to be engaged by said hot end seals, means for maintaining a layer of ice on said faces, and a plurality of vertically spaced tapered ribs on said faces of said members for preventing the full area of each end seal from initial engagement with said layer of ice on said faces, said ribs being upwardly inclined in the direction of movement of wrapped articles between said members for exerting a wiping action on said end seals of said wrapped article.

14. The method of cooling the hot end seals of a wrapped article, said article being wrapped in a wrapper having a heat energizable coating, comprising moving said wrapped article between spaced elongated hot seal cooling members, initially restricting the cooling influence of said members to limited portions only of said hot end seals, and as said wrapped article is advanced between said cooling members, progressively dissipating the heat in said hot seals to completely congeal said coating and secure said seals.

15. The invention defined in claim 1 wherein said elongated ribs terminate short of the length of said refrigerated members, said members having substantially planar faces extending from the terminating ends of said ribs to the end of said members, whereby the seals of wrapped articles moving out of contact with said ribs, come into substantially full contact with said planar faces of said members.

References Cited in the file of this patent

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Number	Name	Date
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2,563,858	McGinley et al.	Aug. 14, 1951