COOLING AND DRYING DEVICE

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This invention relates to improvements in a cooling and drying device, particularly such a device for use in connection with cartons of folded coated materials to prevent the same from sticking when in a folded condition and under relatively heavy pressure.

Today, fresh milk as supplied to users is frequently packed and shipped to a very large extent in disposable basically paper or cardboard cartons. These cartons are generally coated with a material that renders the normally porous and absorbent basic paper stock or cardboard water and moisture proof, that is, non-absorbent while containing the milk or other liquid.

The general method of producing the cardboard stock and eventual carton is of no consequence in so far as this invention is concerned except that the final step in the production of the carton is effected by folding a pre-formed treated blank into a knocked-down condition and with two edges of the blank secured to one another to retain the blank in the said carton knocked-down condition. In this final operation pressure is applied to the folded blank or folded carton particularly along the portions thereof which are adhesively secured to one another and since, as noted above, the said cartons are extremely coated, either with paraffin or more lately, a plastic covering, which does not substantially instantly dry and thereby has been encountered difficulty in opening the cartons from their glued and folded positions.

By the present invention there has been provided a machine which momentarily separates the folds of the said folded carton sufficiently to permit and pass a cooling and drying air relative thereto whereby subsequent refolding or collapsing of the carton is not attended by a sticking between the contacting surfaces whether said contacting surfaces be the internal surfaces of the carton folds or the outside surfaces of superimposed folded cartons.

The principal object of the present invention is, therefore, the provision of a machine for cooling and drying folded cartons prior to packing thereof.

Another object of this invention is the provision of a machine in which folded blanks or knocked-down cartons are arranged in a continuous stream in an upright position and partially opened for the passing therethrough of a cooling and drying atmosphere.

Another object of this invention is the provision of a machine which is capable of being placed in a manufacturing line which produces folded cartons and which arranges the said cartons whereby they may be adequately processed prior to disposal in a packing and shipping container.

A still further and specific object of the present invention is the provision of a machine for accomplishing the foregoing objects which is simple to operate and may be continuously operated.

Other objects and advantages of the present invention should be readily apparent by reference to the following specification considered in conjunction with the accompanying drawings forming a part thereof and it is to be understood that any modifications may be made in the exact structural details shown and described, with-in the scope of the appended claims, without departing from or exceeding the spirit of the invention.

In the drawings:

FIG. 1 is a side elevational view of a carton cooling and drying machine embodying the principles of the present invention.

FIG. 2 is a top plan view of the machine as seen in FIG. 1.

FIG. 3 is a view showing the lower portion of the machine partly in elevation and partly in section as seen from line 3—3 on FIG. 1.

FIG. 4 is an end elevation of the machine as seen from the right hand end of FIG. 1.

FIG. 5 is an enlarged, fragmentary, vertical section through the machine as seen particularly from line 5—5 on FIG. 4.

FIG. 6 is an enlarged, fragmentary view in elevation of the holding and moving mechanism of the machine, forming a detail of the invention.

FIG. 7 is a front elevational view of the said holding and moving mechanism of FIG. 6.

FIG. 8 is an enlarged elevational view partly in section of a portion of the said holding and moving mechanism as seen from line 8—8 on FIG. 7.

FIG. 9 is a perspective view of a knocked-down carton such as would be utilized with the machine of the present invention.

FIG. 10 is an enlarged, fragmentary, perspective view of a portion of the supporting and transporting mechanism for transporting the goods through the machine.

FIG. 11 is a perspective view of the knocked-down carton of FIG. 9 and is the condition thereof when being operated on.

Throughout the several views of the drawings similar reference characters are employed to denote the same or similar parts.

The hereinafter description of the machine will deal with the same as employed in connection with, as noted above, milk cartons of the so-called paper or cardboard variety but it is to be understood that the machine will have equal application in connection with any type of relatively flat articles needing a cooling or drying operation on at least a portion thereof, such as, its opposite vertical surfaces and can with slight modification be adapted for supporting such articles while the said vertical surfaces or portions thereof need a coating of some form applied thereto.

Specifically, and as disclosed in the drawings, the machine of the present invention comprises a supporting structure base or frame indicated in its entirety by the reference numeral 15, on the upper surface of which is a transporting mechanism for moving articles through the machine and indicated in its entirety by the reference numeral 16. Supported by the main frame 15 to be above and co-operate with the transporting mechanism 16 is the treating mechanism herein, specifically, a cooling and drying device indicated in its entirety by the reference numeral 17.

The supporting frame 15 includes a plurality of up-standing legs 18 each provided at its lower end with an adjusting or leveling device 19 which may conveniently take the form of a jack screw. Joining the supporting legs 18 in spaced apart relation are lower joining rails 20 while the upper ends of the legs 18 are similarly joined or secured in spaced apart relation by upper joining rails 21. The said legs and joining rails may conveniently take the form of rectangular hollow steel members, as has become customary in this type of machine construction.

As was noted above the cooling and drying machine of the present invention when employed in producing cartons is, preferably, used in a manufacturing line where-for it operates in conjunction with a delivery mechanism in the said line, namely, the delivery mechanism from the folding and gluing machine which forms the blank into a carton, knocked-down carton, and which said delivery...
mechanism is illustrated at the left hand end of FIG. 1 and is indicated in its entirety by reference numeral 22 and will be subsequently more specifically described.

Before proceeding further with the construction of the machine, it is believed desirable to point out and specifically identify the carton employed with the machine and which carton is illustrated in FIGS. 9 and 11.

As shown in said FIGS. 9 and 11 the carton is of the variety in which are placed for distribution to ultimate consumers, and as is well-known, milk cartons are provided in capacities to contain one-half pint, one pint, one quart, and one-half gallon, as well as in connection with mixed or prepared drinks, such as chocolate milk, the carton may have the capacity of a third pint. Regardless of the capacity of the carton it has substantially the same characteristics and elements which in its folded condition as illustrated at 23 in the drawings includes superimposed panels 24 and adjacent superimposed panels 25 which when opened and disposed at right angles to one another create a substantially rectangular area, as is well-known. To assist in the folding and subsequent erection of the carton the superimposed panels are further unfolded on superimposed scored or fold lines 26 between adjacent panels 24 and 25. The blank is retained in its knob-down position through a glue flap 27, for example, at one of the ends of the panels 24 and 25 and folded by and adhesively secured to its adjacent panel, obviously, with the aforementioned fold line between the said glue flap and panel itself.

At a similar end of each of the panels 24 and 25 there is provided a transverse fold line 28 and 29 thereby foldably securing to said panels end flaps 30 and 31 which are folded to be at right angles to their respective panels and form the closure or bottom for the carton.

Likewise the upper ends of each of the panels 24 and 25 is defined by a score or fold line 32 and 33 thereby integrally hingedly connected with said panels top flaps 34 and 35. The top flaps however are, in the specific carton here being described, not folded to be at right angles or normal to the panels 24 and 25 but to incline toward one another and thereby provide a pyramidal top as is well-known. The upper ends of the pyramidal top panels are joined to one another through glue flaps 36.

This invention is not concerned with the erection or setting up of the carton but is merely with the final stage in the formation of the knob-down or folded cartons as illustrated in FIG. 9. These knob-down or folded cartons just prior to delivery to the machine of the present invention has the glue flap 27 supplied with adhesive and then pressed onto its panel 25 for securement.

The formation of the knob-down carton is practically a continuous operation and the cartons come from the gluing machine in a continuous stream with but a relatively small portion of each carton projecting ahead of the carton disposed therein whereby an eventual stream of cartons superimposed on one another four to eight high issue from the gluing machine to the machine of the present invention or the final discharge mechanism 22 thereof, as above set forth.

This discharge mechanism 22 comprises a lower endless belt 37 and an upper endless belt 38 with the lower belt 37 mounted on pulleys or rollers 39 and 40 while the upper belt 38 is similarly mounted on pulleys or rollers 41 and 42. The pulley or roller 41 is mounted to float, that is, be displaced to accommodate the superimposed cartons since, obviously, the first carton would be single, of single thickness, and this thickness would gradually build up to the thickness capacity of four to eight superimposed cartons as the stream of cartons continues. At the same time the said cartons, whether one or more, would be yieldably held against the belt 37 for movement by the pulley or roller 41, and which belt 37 is power driven as will presently be made clear.

The floating or pressure mechanism, including the pulley 41, also includes a pair of opposed arms 43 that are oscillatably mounted on a pivot 44 carried by and depending from brackets 45, projecting from the adjacent end of the machine, and from which forward end of the machine for the pulley or roller 42. The arms 43 at their lower or forward ends have journaled therein the shaft 46 of pressure pulley 41. From the foregoing it will be noted that the superimposed knob-down cartons are continuous in their movement from a point outside of the machine of the present invention toward the said machine for subsequent operation thereon, as will presently be made clear.

The supporting frame 15, particularly the lower rails 29, are provided thereacross at one point there along, with a platform or supporting plate 47 to which is secured a prime mover or motor 49 having its shaft 49 connected with, for example, a pulley 50 around which extends a belt, such as a V-belt, 51. The V-belt 51 is connected with a speed reducer or speed establishing mechanism 52 of any type that is well-known.

Specifically the V-belt 51 includes a V-belt 53 connected into a mechanical speed establishing device 54 from which extends a final driving shaft 55 and from which extends the power and motion take-offs for the various mechanisms. Specifically, and as seen in FIG. 1, the shaft 55 is provided with a chain sprocket 56 around which extends an endless sprocket chain 57 extending around a sprocket 58 on an idler shaft 59, in turn, provided with a second or driving sprocket 60 for an endless sprocket chain 61. The sprocket chain 61 in turn passes around sprocket 62 on the shaft of the delivery mechanism lower belt drum or pulley 60 for driving the same and thereby the belt 37 from the gluing machine discharge mechanism, and which belt 37 is, in reality, the feeding mechanism for the machine of the present invention. The sprocket chain 61 after passing around sprocket 62 is connected with and drives sprocket 63 on a shaft carrying a belt drum 64 for driving the transportation belt for a purpose subsequently to be made clear. The said sprocket chain 61 then returns to the driving sprocket 60 on the shaft 59.

From the foregoing it will now be appreciated that the articles to be worked upon, cartons 23, are supplied in a stream, each carton superimposed on one another although each slightly advanced with respect to the others, to the cooling and drying mechanism of the present invention.

The knob-down cartons are projected from the belt 37 to the above intimated transportation belt, indicated in its entirety by the reference numeral 67 which passes them through the cooling mechanism. The said transportation belt 67 is, in reality, a pair of relatively narrow belts or bands as clearly illustrated in FIGS. 3 and 10, and, each belt or band, as most clearly illustrated in FIG. 5 comprises an upper or carrying flight 68 extending from the aforementioned driving belt pulley or drum 64 at the left hand end of the machine, as illustrated in the drawings, to a drum 69 near the right hand end of the machine. The portion of the said upper flight 68 of the belt just after it passes the drum 69 is slightly downwardly inclined, as at 70, where it passes over a supporting belt drum 71. The said upper driving belt beyond the drum 71 passes partially around a plurality of other belt drums including a pair of said drums 72 and 73 with said drum 73 having its axis lower than that of drum 72, in turn, having its axis below that of drum 71, for a purpose presently to be made clear. A pair of additional drums 74 are provided and from the last of which drums 74 the belt passes around, see FIG. 1, a tensioning belt drum 75 which is at the outer end of the arm 76 pivotally mounted at 77 to one of the supporting legs 18 of the machine. The transportation belt from the tensioning drum 75 extends as the belt lower flight 78 to a drum 79 from which it extends to the driving pulley or drum 64.

As will be noted in the drawings the portion of the transportation belt between the idler drum 79 and the driv-
ing drum 64, identified in the drawings by the reference numeral 89, has a reasonably sharply upward angle with respect to the delivery belt 37 for a purpose that will presently be made clear. It will also be noted that the portion of the transportation belt, identified by the reference numeral 81, at the rear end of the machine between the belt pulleys or drums 72 and 73, relatively sharply declines for a purpose subsequently to be made clear.

It should be noted that the various belt drums heretofore identified are carried in part by a bearing and mounting plate 82 at the left hand end of the upper rails 21 and in part by a second mounting and supporting plate 83 at the right hand end of said rails.

Pivoted mounted on the said forward plate 82 at the left hand end of the rails 21 is a frame 84, pivoted at 85, and carrying intermediate its ends a relatively large pressure roller or drum 86 with a weight, in the form of a roller 87 at its lower end.

The frame 84 and its pressure drum 86 are so positioned with respect to the transporting belt portion 80 and its driving pulley or drum 64 as to, by gravity, have peripheral contact therewith. This arrangement is such however frame 84 will be outwardly swung to separate pressure drum 86 from the belt portion 88 immediately a carton is brought thereto.

In practice the arrangements are such that the folded or knocked-down cartons are projected upwardly along the line of extent of the transporting belt portion 81 to upstand in this angular position to a point to be, practically, above the transporting belt upper flight 68.

Secured to and upwardly extending from the supporting frame top rails 21 are a plurality of uprights or posts 88, 89 and 90, that is, a set of said posts from each upper side rail. The said posts are conveniently connected to one another at points parallel with but just above the top rail 21 by longitudinal connecting members, one on each side, conveniently angle irons, 91 and which angle irons have the leg thereof not attached to the posts 88, 89 and 90 projecting inwardly or toward one another and act as supports to a deck or platform 92 completely transversely of the machine and which deck or platform forms the support for the transporting belts or band upper flight 68. From this it follows that the transporting belt extending from its upwardly inclined portion 90 proceeds as the upper horizontal flight 68 from one end of the machine to the other.

As illustrated in FIG. 5, in phantom lines, the knocked-down cartons are projected upwardly of the upper flight 68 of the transport belt, as noted above, at substantially the angle of extent of the transport belt flight 68 is provided at one the substantially upright position during the movement thereof through the cooling and drying section of the machine by means presently to be described in detail.

Mounted upwardly of the said transportation belt is the balance of the transfer or transporting mechanism 66 and which consists, on each side of the machine, of upper and lower bearing rails 93 and 94 secured in vertical spaced apart relation to the upright posts 88 and 89. The left hand ends of said bearing rails 93 and 94 are secured to one another by a cap 95 while the right hand ends of said rails are connected by a vertical bearing carrier, indicated in its entirety by the reference numeral 96, in turn secured and carried by vertical post 90. The bearing rails 93 and 94 have at the capped end thereof a sliding bearing 97 in which is mounted a shaft 98 having secured to each of its opposite ends a similar sprocket 99. Each of the bearings 97 has connected swivelly therewith one end of an adjusting screw 100 whichthreadedly extends through its cap 95 to have its end outwardly thereof and is rotatable for shifting the bearings 97 relative to the rails 93 and 94 for thereby adjusting the pitch of the sprocket 99.

Each of the vertical bearing carriers 96 is formed by a pair of plates or bearing rails 101 and 102 laterally spaced from one another to have a space therebetween with said space between the bearing rails 101 and 102 acting similarly to the rails 93 and 94 for supporting a bearing block 103 for adjustment relative thereto. The bearing blocks 103 support a shaft 104 to which are secured sprockets 105 and which shaft 104 is maintained in alignment with the shaft 98 to maintain the sprockets 99 and 105 on each side of the machine, respectively, each having extending therearound an endless conveyor chain 106 which, as will presently be made clear, cooperates with the transportation belt or bands 67 for moving the cartons through the machine.

The bearing rails 93 and 94, on each side of the machine, are mounted in operative and adjustable positions through brackets 107 and 108 thereon which respectively co-operate with and partially embrace posts 88 and 89 for retaining them in position. Actually, the upper bracket 107 associated with the post 88 has swivelly connected therewith the lower end of an adjusting screw 109 which is threaded through a plate 110 at the upper end of said post 88. Similarly, the other ends of the rails 103 and 104 associated with the bearing block 103 are vertically adjustable through an adjusting screw 111 having its lower end connected with the said bearing block 103 and threaded through a cap plate 112 at the top of each vertical bearing carrier 96 and straddling the bearing space between bearing rails 101 and 102.

A portion of the sprocket chain 106 is disclosed in detail and on an enlarged scale in FIGS. 6, 7 and 8 and includes outer links 113 and 113a together with inner links 114 and 114a joined to one another in the usual spaced apart relation by rollers or pins 115. The outer links 113, 113a and the inner links 114 are substantially similar to the average sprocket chain links but the innermost links 114a are dissimilar, in that, each is provided with an upstanding tongue 116 and to which is secured, for movement therewith, a brush, to be subsequently described in detail, which takes up all of the movements of the sprocket chain innermost links 114a in moving through the machine and in passing around the end sprockets.

Specifically, the brush, indicated in its entirety by the reference numeral 117, includes a hollow metal back-up frame 118 into which the brush bristles 119 project and are securely secured thereto. The brush holder back-up frame or spine 118 is secured to the sprocket chain upstanding tongue or lug 116 through a plurality of screws or bolts 120, 121 and 122. As shown in FIG. 8 each of said screws or bolts 120, 121 and 122 is provided with a washer 123 having a decided taper 124 therebeneath and extending to the bolt body portion 125. The other end of each of the bolts 120, 121 and 122 is threaded as at 126 to be threaded into a threaded aperture provided therefore in chain link tongue or lug 116. The said threaded end 126 projects beyond the link tongue lug 116 to receive a lock nut 127 wherefore once the bolts 120, 121 and 122 are secured in position they are substantially immovable as is the brush 117 with respect to its tongue or lug.

In practice, and as seen in FIG. 8, each chain link tongue or lug 116 is provided with the threaded apertures for the bolts 120, 121 and 122 so that the adjacent periphery of each of said bolts body portions 125 is in contact with the upper or lower surface of its brush housing or spine 118 and with the under incline surface 124 of each bolt head 123 overlying the forward edge of its said bush or spine 118 upon the tightening of the said bolts 120, 121 and 122 the said bolt head incline surfaces 124 force the brush backing or spine rear edge against the adjacent surface of its chain link tongue or lug 116, all as clearly illustrated in FIG. 8.

In practice and depending upon the size of carton being worked upon the rails 93 and 94 are adjusted
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vertically of the transportation belt so that the upper ends of said cartons project through the brush bristles and be slightly above the lower flights of the sprocket chains 106, as clearly illustrated in phantom lines in FIG. 5.

As shown in perspective in FIG. 10 the transportation belt, that is, the bands 67 are each, preferably, provided with an upper ribbed surface to assist in moving or transporting the knocked-down cartons through the machine.

In practice the parts are so arranged that the upper ends of the cartons, as noted above, upon being projected through the brush bristles 119 and above the lower flight of the transportation chains 106 have their lower ends in the plane of the top flight 68 of the transportation belt or bands 67 wherefore said lower ends of each of said cartons is in a groove 128 between adjacent lugs 129 of said transportation belt, bands, upper surface while the upper ends are projecting through the bristles 119 of the brushes and the cartons are therefore retained in an upright position while being transported through the machine. It is upper side, indicated by the presence of the cartons that they are being dried and cooled as will presently be made clear.

The transportation chains 106 and parts carried thereby are driven so that the lower flight thereof moves from left to right and the upper flight 45 from right to left but with a sprocket 130 engaging adjacent one thereof with a sprocket 130 about a portion of which, as seen in FIG. 1, is trained endless sprocket chain 131 which then extends about an idler sprocket 132 upwardly of the sprocket 130, carried by a plate 132a, whereupon the sprocket chain 131 extends to a driving sprocket 56a on the final driven shaft 55 of the reducing unit 54. It should be noted that the sprocket 130 is of substantially the same diameter as sprocket 56a on said shaft 55 wherefore the sprocket chain 57 and the transportation chain 106 are actuated at the same rate of speed or rate of travel. From this it follows that the transportation belt or bands 67 moves at the same speed as the transportation chain 106 and the supported cartons thereof are therefore moved at a speed whereby they are maintained in a substantially upright position during movement through the machine.

The drying and cooling mechanism 17 is mounted above the lower flight of the transportation belt or bands 106 and comprises a housing 133 which has its lower end reduced to a width that may be readily defined as a nozzle 134, see FIG. 4. The nozzle 134 has a relatively narrow mouth so as to be pointed out in FIG. 2 and is of a length to extend substantially the full length of the transportation chains 106 and particularly for the length of the lower flight thereof between its supporting sprockets 99 and 105. The lower end of said nozzle is disposed just above the upper ends of the knocked-down or folded cartons as they are passing through the machine as shown most clearly in FIG. 5.

The drying and cooling housing 133 above the nozzle portion 134 laterally, outwardly and upwardly projects as relatively flat sides 135 and 136 and has, what may be termed a refuge numeral 137 which upwardly and rather sharply inclines and, having what may be termed its back or rear side 138 extending substantially normal the housing nozzle portion 134 and to the machine. The said housing 133 at its upper end, really a corner at the junction of the lateral sides 135 and 136, top side 137 and back or rear side 138, is provided with a substantially rectangular or square sleeve or collar 139 through which the housing 133 is connected with a fan blower housing 140.

The blower housing 140 is provided substantially centrally thereof with a shaft 141 to which is secured internally of the fan housing 140 a fan blade 142.

The fan shaft 141 projects outwardly of one side of the fan housing 140 as a motor shaft 143 associated with an electric motor 144.

The motor 144 is secured in any suitable or desirable manner to a support 145 immovable mounted on a plate 146 that is carried by the oppositely outwardly extending flanges 147 and 148 respectively of angle irons 149 and 150.

The angle irons 149 and 150 are of such length as to extend between and slightly beyond the sides of the posts 89 and 90 and are such as to form a guide for the parts supported thereby with respect to the said posts 89 and 90.

The said angle iron 149 and 150 are retained in vertically adjusted positions on the posts 89 and 90 by means of adjusting screws 151 and 152 each of which has its lower end swivelly connected to the horizontal leg 147 of the angle iron 149 with said connection being near the opposite ends of said angle iron and with said adjusting screws 151 and 152 respectively threaded through plates 153 and 154 at the upper ends of the posts 89 and 90.

The other side of the blower housing 140 has secured to depend therefrom a supporting bracket 155 which is secured to and carried by the interior of the housing said angle iron 157. The angle iron 157 is complementary to the angle iron 149 and similar thereto is disposed on the inner face of the back posts 89 and 90. Disposed against the outer surfaces of the said back posts 89 and 90 is a plate 158 which takes the place of the above noted and forms a housing 159, being of the nature including the said angle iron 157, plate 158 and connecting platform 159 on which is the blower housing supporting bracket 155.

The angle iron leg 156, similar to its complementary angle iron leg 157 has swivelly connected thereto the lower ends of adjusting screws 160 which similar to the adjusting screws 151 and 152 are threaded through cap plates 161 at the upper ends of the rear posts 89 and 90. The said rear post 89 is, similar to the front post 89, as illustrated in FIG. 1, provided with an adjusting screw 162 threadedly extending through a cap plate 164 on the back post 89.

From the foregoing it will be noted that the transportation chain mechanism 16 is adjustable toward and from the transportation belt or band depending upon the size of the knocked-down or folded carton being processed. This adjustment of the parts being effected through the adjusting screws 109 and 111 relative to the upright posts 88 and 89 since the said posts have connected therewith for sliding adjustment relative thereto the rails 93 and 94 through the bracket devices 107 and 108. From the foregoing it will also be noted that the drying and cooling mechanism 17 is similarly adjusted since they are slidably carried by the uprights or posts 89 and 90 and are adjusted through adjusting screws 151 and 152, with said mechanism being slidably connected through, on one side, angle irons 99 and 105 and, on the other side, by the angle iron 157 and plate 158.

From the foregoing, and with particular reference to FIGS. 1 and 5, it will be noted that even though the fan blade 142 is located adjacent one end of the housing 133 the gradual diminishment in height of said fan blade 142 as shown by the reference numeral 133 from its blower fan blade 142 to its other end, particularly by the inclined top 137 the air from the said fan blade 142 is distributed throughout the length of the housing. To ensure the directing of this drying and cooling air to each of the cartons the nozzle 134, the relatively narrow transverse portion thereof, is provided with a plurality of deflector plates 162 dividing the said housing reduced or nozzle portion into, in effect, a plurality of individual nozzles or passageways 163.

There is illustrated in perspective in FIG. 11 a folded carton at the time the drying and cooling air is being directed thereto by the nozzle passageways 163 between the plates 162. As will be there seen the opposed sides, that is, the superimposed panels, are slightly separated to provide an opening 164 downwardly of the folded carton and this separation of air space is caused by the flow of the air under pressure. It will be appreciated that this
separation of the parts is quite small since there is only required enough space to permit this air flow for accomplishing its purpose of cooling and drying. It will further be appreciated that the said superimposed panels are in this slight separated positions for a reasonable period of time while the said cartons are passing for substantially the full length of the upper flight 68 of the transportation belt and which time period is sufficient to accomplish the cooling and drying purpose. The dimensions of the parts are such that the complete drying and cooling is effected during this time interval.

After the cartons and folded cartons, individually, have passed beyond the nozzle portion, 134, and as noted above, the transportation belt or bands top flight 68 has a slightly declining portion 70 between belt pulleys or drums 69 and 71. The cartons in traveling with this portion 70 of the transportation belt are vertically lowered from the brushes 117 and are disengaged from the brushes 119 thereof whereupon the said cartons fall by gravity to the right, since they are normally biased that way, as seen in FIG. 5 and onto a further portion of the transportation belt or bands top flight, referred to above and indicated by the reference numeral 81, and disposes or discharges the cartons onto a discharging mechanism as will presently be defined.

The discharge mechanism, indicated in its entirety by the reference numeral 166 is mounted outwardly, to the right as seen in FIG. 1, of the cooling and drying mechanism and consists of an endless belt 167 mounted at opposite ends on belt drums 168 and 169. The said belt drums 168 and 169 are so mounted as to have the upper operative flight thereof on and moving relative to a supporting table 170 suitably carried by the machine upper horizontal rails 21. The belt 167 is maintained in proper tension by mounting the belt pulley or drum 169 on the upper end of a pair of arms 171 pivoted, respectively, at 172 to an end supporting leg 18. The tension of the parts is maintained through a tensioning screw 173 carried by the arms 171 and butting against a transverse brace 174 extending between the said end legs 18.

The discharge belt 167 is power actuated to have its upper flight move to the right as seen in FIG. 1 and for this purpose has secured to the shaft of the belt pulley or drum 168 a sprocket chain 175 operatively connected with sprocket chain 131 between the idler sprocket 132 and the initial driving sprocket 56a.

From the foregoing it will now be appreciated that there has been provided a machine for receiving knocked-down cartons substantially immediately after having had their edges glued or secured to one another with said machine and said cartons being passed through a stream of cooling and drying air with said cooling and drying air temporarily opening the folded carton to cool and dry the interior of the carton as well as the exterior thereof. It will further be noted that the said now cooled and dried folded cartons are transported from the vicinity of the machine for further use and which is the packing of the cooled and dried cartons into a shipping container for shipment to the ultimate user.

From the foregoing it will further be noted there has been provided a mechanism for accomplishing the objects initially set forth.

What is claimed is:

1. In a device of the class described for cooling and drying relatively flat folded cartons comprising a housing, a receiving station at one end of said housing and a discharge station at the housing, said receiving station of the housing receiving said folded cartons in a stream and in a relatively horizontal position, means at said receiving station for separating said cartons one from the other and including power operated means for discharging said cartons one at a time from said receiving station in a substantially vertical position, conveyor means for holding said cartons in substantially the vertical position thereof as effected by the receiving station discharge means and conveying said cartons through the housing to the discharge end thereof, means including air above said conveyor means for slightly separating the folded portion of the carton and directing cooling and drying air along the inside and outside of the folded carton, and said conveyor means including brush bristles in the plane of the line of movement of the conveyor means for helping in holding the upper ends of said cartons in their relative upright position.

2. In a device of the class described for cooling and drying relatively flat folded cartons as set forth in claim 1 characterized by, said conveyor means also including a conveyor belt below the brush bristles having thereon transverse pusher members in spaced relation to one another sufficient to maintain the lower ends of the relatively upright cartons in relation to the portion thereof engaged with the brush bristles while the folded cartons are being conveyed, said lower conveyor member at the discharge end of the housing being outwardly and upwardly inclined to a point for release of the upper end of the folded carton from the brush bristles wherefore said folded cartons are essentially free of the brush bristle support and fall by gravity from the conveyor.

3. In a device of the class described for cooling and drying relatively flat folded cartons as set forth in claim 1 characterized by, said conveyor means also including a conveyor belt below the brush bristles having thereon transverse pusher members in spaced relation to one another sufficient to maintain the lower ends of the relatively upright cartons in relation to the portion thereof engaged with the brush bristles while the folded cartons are being conveyed, said lower conveyor member at the discharge end of the housing being outwardly and upwardly inclined to a point for release of the upper end of the folded carton from the brush bristles wherefore said folded cartons are essentially free of the brush bristle support and fall by gravity from the conveyor.

4. In a device of the class described for cooling and drying relatively flat folded cartons as set forth in claim 1 characterized by, said receiving station discharging means including a belt at an angle substantially vertical to the angle of receipt of the cartons at the receiving station, and a pressure roller pivotally carried by the housing for holding the cartons being discharged to the conveyor belt wherefore said cartons are associated with the conveyor means in a substantially upright position.

5. In a device of the class described for cooling and drying relatively flat folded cartons as set forth in claim 1 characterized by, said conveyor means for directing cooling and drying air to the cartons while being conveyed including a housing whose vertical sides converge toward one another to direct the cooling and drying air directly on the carton along the inner and outer surfaces thereof.

6. In a device of the class described for cooling and drying relatively flat folded cartons as set forth in claim 1 characterized by, said conveyor means for directing cooling and drying air to the cartons while being conveyed including a housing whose vertical sides converge toward one another to direct the cooling and drying air directly on the carton along the inner and outer surfaces thereof, said converging sides of the cooling and drying air housing forming at their ends a nozzle, and means throughout the length of the nozzle for forming successive jet streams of cooling and drying air for successive direction to successive cartons.

7. In a device of the class described for cooling and drying relatively flat folded cartons as set forth in claim 1 characterized by, said conveyor means comprising an upper and a lower endless conveyor member, each conveyor member including an upper and a lower flight with the upper conveyor member including the brush bristles with its lower flight and brush bristles opposed to the lower conveyor member upper flight, said opposed flights being spaced from one another and the height of the folded cartons to be conveyed thereby, and with said upper conveyor member lower flight and brush bristles thereby being flexible in the direction of movement of the conveyors so that the upper end of the folded cartons near the lower end thereof having the folded portions of the carton held in slight separation by the cooling and drying air, and said cartons...
having their lower ends resting on the upper flight of the lower conveyor member.

8. In a device of the class described for cooling and drying relatively flat folded cartons as set forth in claim 1 characterized by said conveyor through the machine comprising an upper and a lower endless conveyor member, each conveyor member including an upper and a lower flight with the upper conveyor member including the brush bristles with its lower flight and brush bristle opposed to the lower conveyor member upper flight, said opposed flights being spaced from one another an amount less than the height of the folded cartons to be conveyed thereby, and with said upper conveyor member lower flight and brush bristles thereby being flexible in the direction of movement of the conveyors so that the upper end of the folded carton is flexibly held near its upper end without having the folded portions of the carton held against slight separation by the cooling and drying air, said cartons having their lower ends resting on the upper flight of the lower conveyor member, and said upper flight of said lower conveyor member having formed transversely thereof spaced lugs at the point of contact of the folded cartons with said lower conveyor member upper flight.

9. In a device of the class described for cooling and drying relatively flat folded cartons as set forth in claim 1 characterized by, said conveyor through the machine comprising an upper and a lower endless conveyor member, each conveyor member including an upper and a lower flight with the upper conveyor member including the brush bristles with its lower flight and brush bristle opposed to the lower conveyor member upper flight, said opposed flights being spaced from one another an amount less than the height of the folded cartons to be conveyed thereby, and with said upper conveyor member lower flight and brush bristles thereby being flexible in the direction of movement of the conveyors so that the upper end of the folded carton is flexibly held near its upper end without having the folded portions of the carton held against slight separation by the cooling and drying air, said cartons having their lower ends resting on the upper flight of the lower conveyor member, and said upper flight of said lower conveyor member having formed transversely thereof spaced lugs at the point of contact of the folded cartons with said lower conveyor member upper flight.

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