

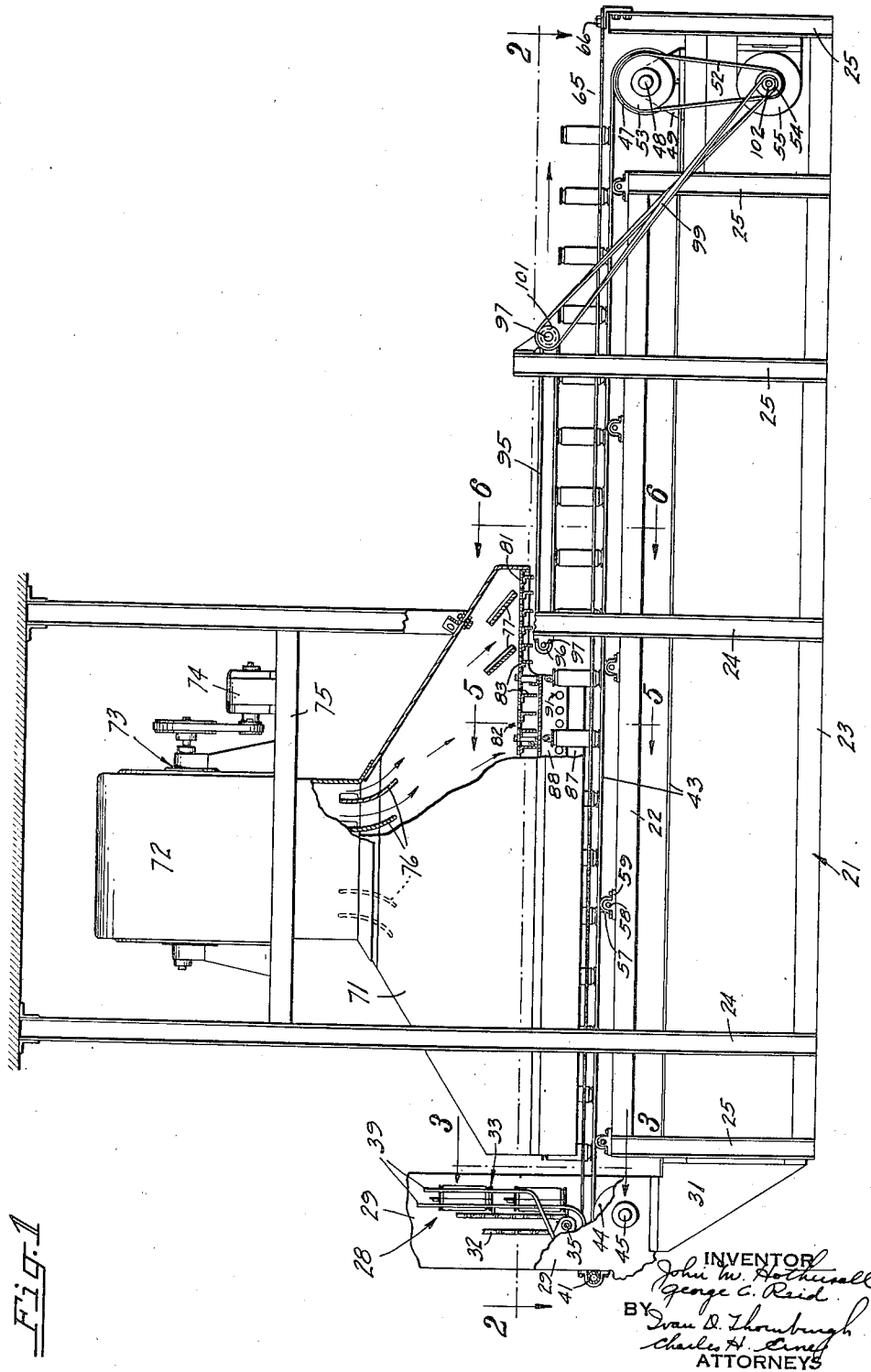
May 9, 1939.

J. M. HOTHERSALL ET AL
CAN COOLING AND DRYING MACHINE

2,157,131

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Fig. 2

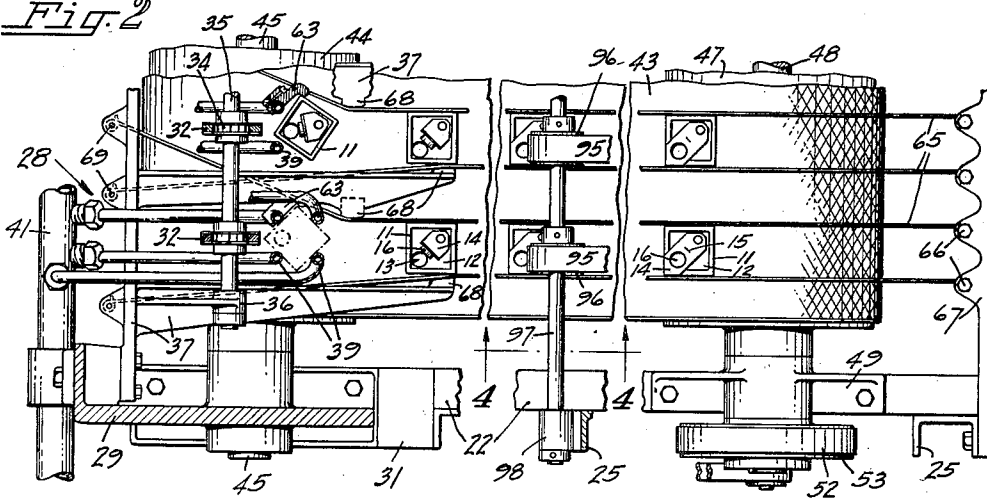


Fig. 3

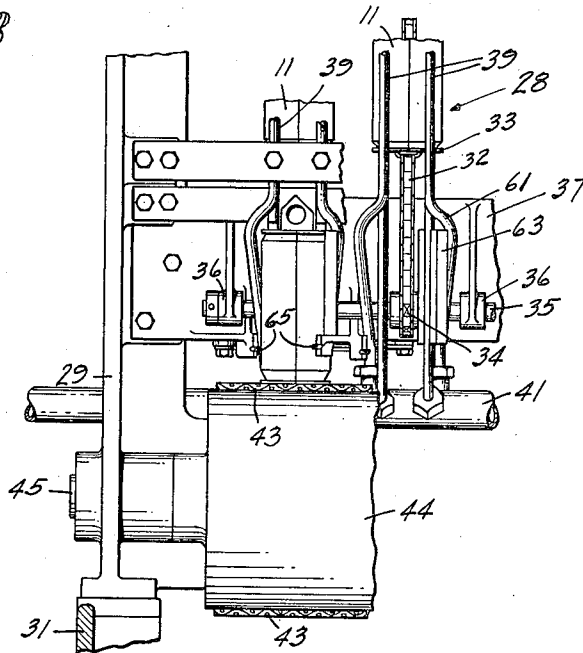
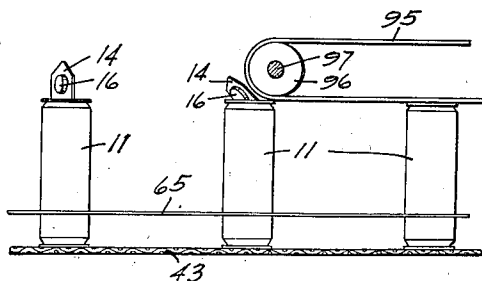


Fig. 4



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Fig. 5

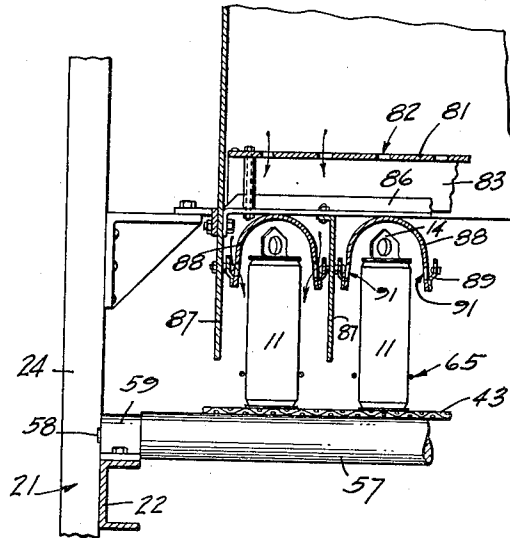
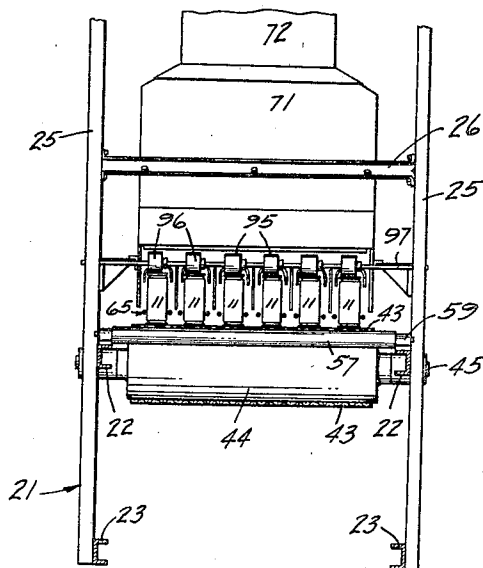


Fig. 6



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CAN COOLING AND DRYING MACHINE

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11 Claims. (Cl. 34—12)

The present invention relates to a container or can cooling and drying machine and has particular reference to such a cooling and drying machine which also provides for temporarily closing the partially or fully cooled and dried cans, such cans having been previously coated with a hot liquid coating material.

The invention contemplates the cooling and sealing of a sterile or germ free empty fibre can which has just previously been coated with hot liquid paraffin or the like to render it liquid-proof for future use as a container of liquids such as for example, milk, the empty can remaining in its sealed and sterile condition until the time it is opened for filling irrespective of subsequent handling which may include shipment to some distance as to a dairy and storage at the dairy.

An object of the invention, therefore, is the provision of a machine for cooling and drying empty fibre cans which have been previously coated interiorly as well as exteriorly with a coating material applied while hot, the cooling and drying action being effected by currents of air directed against the sides of the can to cause a progressive cooling and setting of the coating material from bottom to top and substituting a cooled atmosphere for the heated air trapped inside.

Another object is the provision in such a machine of devices for closing the can with a plug or cover which has been previously coated with the coating material, the plug or cover being pressed in place on the can after substitution of cool air for the hot air in the interior of the can but before the coating material at the top has set, so that the final setting of the coating material will hermetically secure the plug or cover in place.

Another object is the provision of a machine of this character wherein only cool, sterilized, germ freed, or filtered air is sealed in the empty can to maintain a sterile condition during shipment and storage.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a side elevation of a machine embodying the instant invention, parts being broken away;

Fig. 2 is an enlarged longitudinal top plan view

taken substantially along the line 2—2 in Fig. 1, parts being omitted and other parts being broken away;

Fig. 3 is an enlarged fragmentary vertical section taken substantially along the line 3—3 in Fig. 1;

Fig. 4 is a fragmentary detail as viewed substantially along a plane indicated by the line 4—4 in Fig. 2; and

Figs. 5 and 6 are transverse vertical sections taken substantially along the respective lines 5—5 and 6—6 in Fig. 1, Fig. 5 being drawn on an enlarged scale and showing only a fragment of the machine.

One form of can such as a fibre can is designated by the numeral 11 (Figs. 2, 4 and 5) and is illustrated in the drawings as an example of a suitable container which is adapted to be used in the manner and for the purposes herein contemplated. This can consists of a rectangular body which is closed by top and bottom fibre members 12, the top having a discharge opening 13 formed adjacent one edge. A closure element 14 preferably also made of fibre is secured to the top 12 in any suitable manner by a staple 15. This closure element includes a drawn plug section 16 which is adapted to enter into and completely fill the opening 13 when the element is in closing position.

This type of can is one which is becoming more and more popular for the daily dispensing of milk. This can including its closure element is interiorly and exteriorly liquid-proofed preferably with paraffin or the like material which is applied to the can while hot and in a liquid state.

While the cans are hot and wet with the paraffin they are fed in any suitable manner, as for example from a previous machine, into the instant machine preferably in a continuous procession and in spaced rows which extend transversely across the machine. The cans enter the machine in upright or vertical position with their closure elements 14 open, that is, with the elements raised vertically as shown at the extreme left in Fig. 4.

The hot cans as received into the present machine are first brought under the influence of a current of filtered, germ freed or sterilized air which is directed against the outer side walls of the can, the top of the can and its interior being shielded at this time against the cooling and drying effect of the air. This permits the paraffin on both the inside and outside of the can to set or solidify progressively from the bottom toward

the top open end. The hot air inside the can therefore undergoes a change during this progressive drying.

As the cooling and drying progresses the shielding action terminates and the sterile air is then admitted directly into the can. The closure element 14 is then quickly closed before the paraffin coating thereon is fully set. Currents of air then impinge upon the top of the closed can causing the paraffin to solidify. This seals the closure element in place in the can opening 13. Sterile air is thus trapped and sealed in the can. The can may then be discharged to any suitable place of deposit for shipment or storage. By cooling the air on the interior of the can before the can is sealed subsequent creation of a vacuum, with a possible resulting collapse of the can walls, is avoided.

A preferred embodiment of the instant invention includes a machine main frame 21 (Figs. 1 and 6) comprising upper and lower horizontal channel beams 22, 23 which provide bed and base members for the machine. These members are held in spaced relation one above the other by spaced long and short vertical channel beams or uprights 24, 25. The uprights are transversely tied together by cross beams 26. One end of this frame, at the left as viewed in Fig. 1 and which will be considered as the can entrance end of the machine, supports a plurality of transversely spaced can feeding devices or vertical elevators 28 (see also Figs. 2 and 3) for bringing the cans into the machine.

The elevators 28 are arranged side by side and are supported on auxiliary frames 29 bolted to brackets 31 which are secured to the end pair of main frame uprights 25. Each elevator comprises an endless chain 32 having flights 33 secured thereto at spaced intervals along its length. The chain takes over an upper sprocket (not shown) and a lower sprocket 34, the latter being mounted on a cross-shaft 35 carried in bearings 36 formed in a bracket 37 which is bolted to the auxiliary frames 29. The cross-shaft is continuously rotated in any suitable manner in time with the other moving parts of the machine.

Hot cans 11 placed by any suitable means on the flights 33 of the continuously and simultaneously moving elevator chains 32 are thus carried down into the machine in spaced rows extending transversely of the machine. During this vertical travel of each can in a row it is guided by inner and outer pairs of spaced and vertical tubular guides 39 (Figs. 1, 2 and 3) which are disposed adjacent the descending run of each elevator chain 32. The guides are located so as to retain the can in a diagonal position as shown in Fig. 2 with the corner of the can top, containing the opening 13, nearest the elevator chain so that the closure element 14 will be in proper alignment for sealing as will be hereinafter described.

Steam is passed through the guides to prevent chilling and the formation of solidified spots or streaks in the paraffin coating on the can side walls as the latter engage against the guides. The steam is supplied to the guides at their upper ends from any suitable source of supply and is exhausted at their lower ends into an outlet pipe 41 into which the guides are threaded.

At the lower or exit end of the guides 39 the descending cans meet the upper run of a horizontal, endless belt conveyor 43. This conveyor is located directly under the elevators 28 and transfers one entire row of cans in a horizontal path of travel through the machine. During such

travel the cans remain in a vertical or upright position.

Belt conveyor 43 extends substantially the full length and width of the machine and is preferably made of wire mesh. At the can entrance end of the machine the mesh belt takes over an idler pulley 44 mounted on a cross-shaft 45 carried in bearings formed in the auxiliary frames 29. At the opposite end of the machine the belt passes over a driving pulley 47 mounted on a drive shaft 48 carried in brackets 49 bolted to the main frame 21.

The drive shaft is preferably rotated by an endless driving belt 52 which takes over a pulley 53 mounted on one end of shaft 48 and over a smaller pulley 54 which is carried on the drive shaft of an electric motor 55. The motor is bolted to the main frame 21. Intermediate the conveyor pulleys 44, 47 the wire mesh belt is supported against sagging by transverse rollers 57 (see also Fig. 5) having trunnions 58 which are carried in bearing blocks 59 secured to the top of the machine bed rails 22.

The continuous movement of the mesh belt 43 carries cans deposited thereon away from the vertical guides 39, the forward pair of each set of guides being flared and bent back as at 61 (Fig. 3) to permit clearance for the cans. As each can moves away from the vertical guides it is rotated slightly on its own vertical axis from the diagonal position as received on the belt to a squared position as shown in Fig. 2.

The can is thus rotated through approximately 45 degrees and can be better guided in its horizontal path of travel through the machine. Turning of the can is effected by a stationary hooked finger 63 (Figs. 2 and 3) which is clamped around one of the tubular guides 39 of each set. As the can moves forward one corner strikes against the finger and the can is properly rotated.

Cans as they travel with the mesh belt 43 are guided along a straight path through the machine by spaced and parallel wires 65 which extend longitudinally of the machine frame 21 and are spaced above the moving belt. At the can exit end of the machine the wires are secured by bolts 66 (Fig. 2) to a transverse tie bar 67 which is bolted to the end pair of uprights 25. At the can entrance end of the machine the wires are drawn taut over lugs 68 formed on the bracket 37, the ends of the wires being secured in place by bolts 69 which are threaded into the bracket. The lugs 68 permit the wires to be bent outwardly while held taut to provide sufficient space for the turning of the can and to insure proper entrance into the parallel section of the guide wires.

The moving mesh belt 43 carries the guided cans first through a cooling and drying device. This comprises a flared or tapered hood 71 (Figs. 1, 5 and 6) which is located above the belt and is supported on the long uprights 24 of the main frame 21. The top of the hood merges into a casing 72 which houses a blower 73 for introducing into the hood filtered, germ freed or sterilized air from any suitable source of supply. The blower and an electric motor 74 for operating it are supported on cross beams 75 the ends of which are secured to the uprights 24.

Currents of air created by the blower are directed through the hood 71 toward its bottom by curved transverse deflector plates 76 which are located at the neck of the hood just beneath the blower, and also by straight transverse deflector plates 77 which are located adjacent the bottom of the hood.

The bottom of the hood 71 carries a horizontal plate 81 (Figs. 1 and 5) having transverse rows of perforations 82 through which the air currents pass. Transverse depending deflector bars 83 are secured to the bottom of plate 81 to direct the air downwardly. Plate 81 is supported on transverse angle beams 86 which are bolted to the sides of the hood. Beams 86 also carry depending longitudinal side plates 87 which extend down between the rows of cans passing under the hood on the mesh belt 43.

Side plates 87 carry longitudinal curved arches 88 which extend nearly the full length of the hood, terminating a short distance from its rear end (toward the right as viewed in Fig. 1). The longitudinal marginal edges of the arches extend down adjacent the sides of the passing cans and are secured to the side plates 87 by clips 89 which are shaped to hold the sides of the arches spaced away from the plates for the passage of air therebetween. A line of holes 91 is also provided in the sides of the arches just above the clips to permit the passage of air therethrough.

As the hot cans 11 are conveyed under the hood 71 as best shown in Fig. 5 air from the blower 73 is directed through the perforations 82 in bottom plate 81 and is deflected along the outer surface of the curved arches 88 passing down through the arch holes 91 and between the longitudinal edges of the arches and the side plates 87. This causes the air currents to impinge against the sides of the cans and to pass down adjacent their bottoms, escaping through the wire meshes of belt 43 while the top of the cans are protected by the arches 88.

Cooling and drying of the cans therefore begins along the outside walls from the bottom up, penetrating to the interior of the cans in the same order. This expels first the hot air from the inside bottom portions of the cans, the hot air escaping through the can openings 13 and tending to prevent immediate setting of the paraffin adjacent the top of the cans.

At the terminal ends of the arches 88 the partially cooled and dried cans move through a short unprotected section of the hood where the air passing through the bottom perforations 82 is directed by the transverse deflecting bars 83, directly on top of the cans. This air tends to cool and dry particularly the upper portion of the can, some of the air, as hereinbefore mentioned, entering the interior of the can to replace the hot air.

Before the upper portion of the can has cooled and dried sufficiently to set the paraffin, the can closure member 14 is closed. This is effected by a horizontal endless can closing belt 95 (Figs. 1, 2, 4 and 6) which is located over the longitudinal path of travel of the cans, adjacent the hood 71. There are a plurality of these belts, one for each longitudinal row of cans.

Each can closing belt 95 takes over a pair of pulleys 96 mounted on spaced and parallel cross-shafts 97 journaled in bearings 98 fastened to the uprights 24, 25 of the main frame 21. The cross-shafts are rotated in any suitable manner in time with the other moving parts of the machine, preferably by a driving belt 99 which operates over a pulley 101 mounted on one of the cross-shafts 97 and over a driving pulley 102 mounted on the drive shaft of the electric motor 55.

Partially cooled and dried cans moving along with the wire mesh belt 43 are carried under the can closing belt 95 as shown best in Fig. 4. The

upright closure element 14 of the can strikes against the belt 95 and is pressed down as the can moves under the belt. This action inserts the drawn plug section 16 into the can opening 13 completely filling it. The belt firmly presses the plug section home.

The belt 95 continues to hold the closure element in closed position while the can moves along so that the air currents from the hood 71 impinging against the top of the can will fully and finally set the paraffin coating on both can and closure element. This hermetically seals the can and thus traps the filtered, germ freed or sterilized air in the can. Such closing provision protects the sealed can against contamination until opened for filling. At the end of travel of the cans under the closing belt 95 they move along toward the discharge end of the machine where they are removed in any suitable manner for shipment or storage.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

We claim:

1. In a machine for cooling and drying freshly coated cans, the combination of devices for passing the cans along a predetermined path of travel while maintained in a vertical position, means for creating a current of air and directing the same toward said cans, and means adjacent the path of travel of the moving cans for shielding the upper ends thereof from said air current, said shielding means having an aperture for directing said air current against the sides of the cans for setting and hardening the coating on the can walls.

2. In a machine for cooling and drying freshly coated cans, the combination of devices for passing the cans along a predetermined path of travel, means for creating a current of air, and means adjacent the path of travel of the moving cans for directing said air current thereagainst, said means having spaced apertures in different portions thereof for directing said air current respectively first against the sides of the moving cans and thereafter against the tops thereof for progressively setting and hardening the coating on the can walls from the bottom to the top.

3. In a machine for cooling and drying cans which have been freshly coated interiorly and exteriorly, the combination of devices for passing the cans while maintained in a vertical position along a predetermined path of travel, means for creating a current of air, an apertured element adjacent the path of travel of the moving cans for directing said air current against the sides thereof while shielding the upper ends of the cans from said air current whereby to first set and harden the coating on the can side walls, and a second apertured element also adjacent the further path of travel of the moving cans for subsequently directing said air current against the top and into the interior thereof.

4. In a machine for cooling and drying freshly coated cans, the combination of devices for passing the cans while maintained in a vertical position and in opened condition along a predetermined path of travel, means for creating a current of air, and a shield disposed above the path

of travel of the moving cans for protecting the opened tops and interiors of the cans against the air current, said shield having spaced apertures in the opposite side walls of the same for directing the air current against the sides of the passing cans for setting and hardening the coating thereon.

5. A machine for cooling and drying cans having an opening in one end and being freshly coated interiorly and exteriorly with hot paraffin and the like, comprising in combination a conveyor for passing the hot cans in a vertical position along a predetermined path of travel, means for creating a current of cooling and drying air, and an arcuate shield open at its bottom and having spaced apertures in its opposite side walls for directing said air current against the sides of the moving cans for cooling and setting the paraffin on the walls thereof while simultaneously shielding the tops and interiors of the cans against the air current to facilitate escape of the hot air from within the cans.

6. A machine for cooling and drying cans having an opening in one end and being freshly coated interiorly and exteriorly with hot paraffin and the like, comprising in combination a conveyor for passing the hot cans in a vertical position along a predetermined path of travel, means for creating a current of cooling and drying air, means disposed in the path of travel of the cans and provided with spaced apertures for directing said air current against the sides of the moving cans for cooling and setting the paraffin on the walls thereof, said air current directing means having imperforate portions for shielding the tops and interiors of the cans against the air current to facilitate escape of the hot air from within the cans, and separate means disposed in the path of travel of the cans and spaced from said air current directing means for directing said air current against the tops of the cans and into their interiors after the hot air has escaped.

7. A machine for cooling and drying cans having an opening in one end and being freshly coated interiorly and exteriorly with hot paraffin and the like, comprising in combination a conveyor for passing the hot cans in a vertical position along a predetermined path of travel, means for directing a current of sterile cooling and drying air against the sides of the moving cans for cooling and setting the paraffin on the walls thereof while shielding the tops and interiors of the cans against the air current to facilitate substitution of cooler air for the hot air within the cans, separate means for directing said sterile air current against the tops of the cans and into their interiors after such substitution, and instrumentalities for closing said cans after they are filled with the cooler sterile air and before the paraffin on the tops of the cans becomes set so that setting of the paraffin will seal the closed can and trap the sterile air in the interior thereof.

8. A machine for cooling and drying cans having an opening at one end and being freshly coated interiorly and exteriorly with hot paraffin and the like, comprising in combination feeding devices for delivering hot cans in a vertical position, said feeding devices having heated runways to prevent marring the cans fed therethrough, a conveyor adjacent said feeding devices for receiving hot cans therefrom and for carrying them along a predetermined path of travel, and an arcuate shield open at its bottom disposed adjacent the path of travel of the cans and having

spaced apertures in its opposite side walls for directing a current of air against the sides of the cans for cooling and setting the paraffin on the walls thereof.

9. A machine for cooling and drying cans having an opening in one end and being freshly coated interiorly and exteriorly with hot paraffin and the like, comprising in combination multiple feeding devices for delivering transverse rows of hot cans in a vertical position, said feeding devices having heated runways for separating the cans of a row and for preventing marring of the cans fed therethrough, instrumentalities cooperating with said feeding devices for partially rotating each delivered can on its vertical axis into a predetermined position for subsequent treatment, a conveyor adjacent said feeding devices for receiving the rows of hot cans and for carrying them along a predetermined path of travel, guide wires adjacent said conveyor for maintaining the cans of a row in properly spaced relation, and means disposed adjacent the path of travel of the spaced cans for directing a current of air against their sides for cooling and setting the paraffin on the walls thereof.

10. A machine for cooling and drying cans having an opening in one end and being freshly coated interiorly and exteriorly with hot paraffin and the like, comprising in combination a wire mesh conveyor for carrying in a vertical position and along a predetermined path of travel hot cans having a closure element attached to the tops thereof, an apertured shield disposed longitudinally of said conveyor and above the path of travel of the cans for directing a current of sterile air against the sides of the moving cans for cooling and setting the hot paraffin on the walls thereof while protecting the can tops and the closure elements against the air current to delay the cooling thereof and to facilitate escape of the hot air from within the cans, and an endless belt disposed adjacent the discharge end of said shield for closing the attached closure elements before the paraffin thereon becomes set but after the hot air has escaped from the interior of the cans, said endless belt maintaining the closure elements in closed position until the paraffin thereon has become set and hermetically sealed the cans.

11. A machine for cooling and drying cans having an opening in one end and being freshly coated interiorly and exteriorly with hot paraffin and the like, comprising in combination a conveyor for carrying in a vertical position and along a predetermined path of travel longitudinal and transverse rows of hot cans having closure elements attached to the tops thereof, a hood disposed over the conveyor and under which the cans pass, means for creating currents of sterile air within said hood, separator plates depending from the bottom of said hood and longitudinally extending between the transverse rows of cans, curved shields coextensive with said separator plates but spaced relative thereto over the longitudinal rows of cans and having apertures disposed adjacent the separator plates, said shields and said separator plates acting to direct the sterile air currents against the side walls of the moving cans for cooling and setting the hot paraffin on the interior as well as the exterior walls thereof while protecting the tops of the cans and the closure elements against exposure to the air currents, deflecting bars depending from the bottom of said hood across the path of travel of the cans adjacent the discharge

end of said curved shields for directing sterile air against the can tops and into the interior of the can, and a plurality of endless belts disposed over the conveyor adjacent said deflecting bars
5 for closing the closure elements of the cans as the latter pass under the belts and before the paraffin sets, said belts holding the closure elements in

can closing position while the sterile air is deflected against the can tops to set the paraffin and thereby hermetically seal the can and trap the sterile air within the can.

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