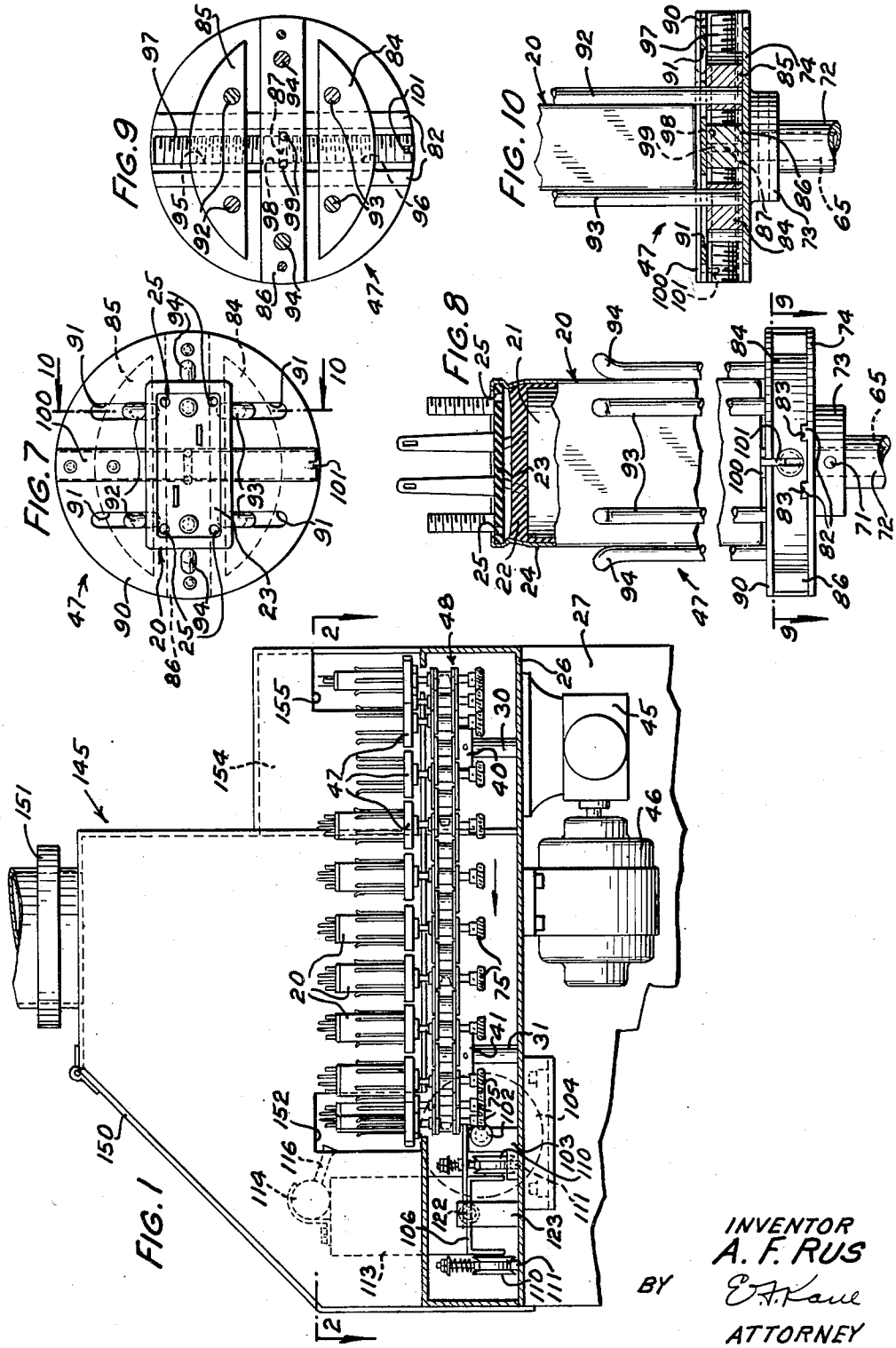
March 11, 1952 A. F. RUS 2,589,143

METHOD AND APPARATUS FOR REMOVING HEAT FUSIBLE MATERIAL FROM CANS

Filed Nov. 14, 1947 4 Sheets-Sheet 1



INVENTOR
A. F. RUS
BY E. A. Kane
ATTORNEY

March 11, 1952 A. F. RUS 2,589,143

METHOD AND APPARATUS FOR REMOVING HEAT FUSIBLE MATERIAL FROM CANS

Filed Nov. 14, 1947 4 Sheets-Sheet 2

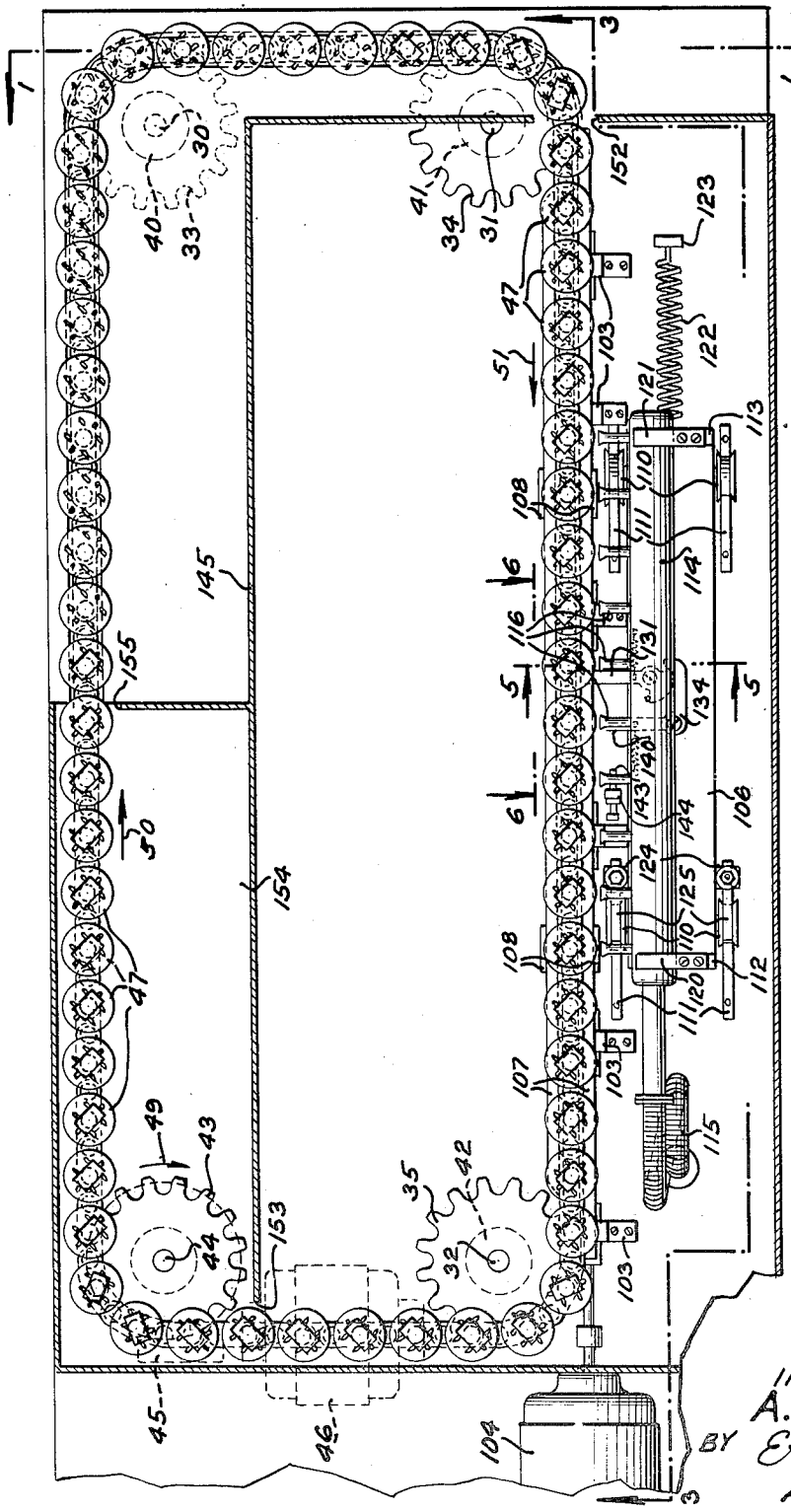


FIG. 2

INVENTOR
A. F. RUS
BY E. A. Kane
ATTORNEY

March 11, 1952

A. F. RUS

2,589,143

METHOD AND APPARATUS FOR REMOVING HEAT FUSIBLE MATERIAL FROM CANS

Filed Nov. 14, 1947

4 Sheets-Sheet 3

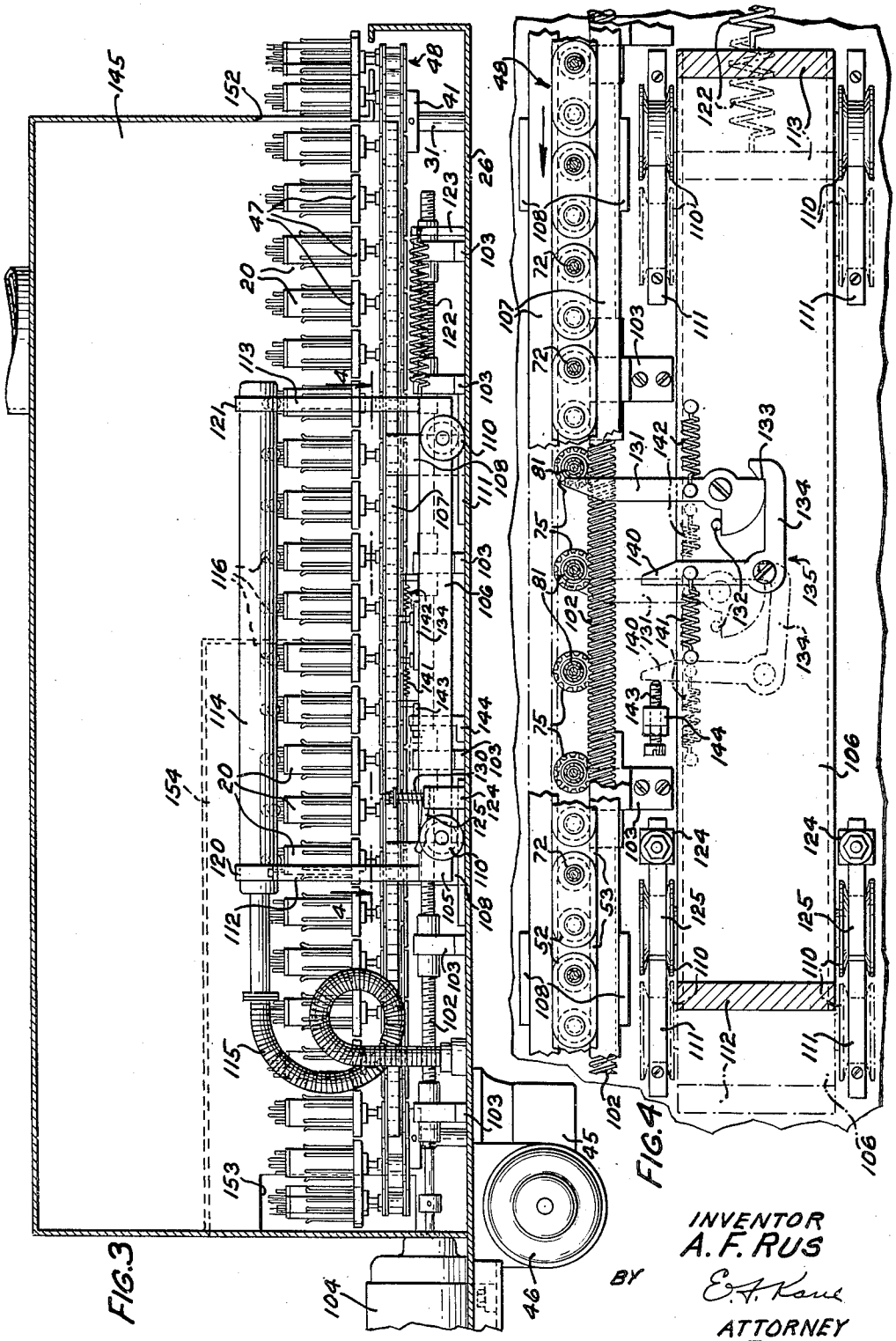


FIG. 3

FIG. 4

INVENTOR
A. F. RUS
BY
E. A. Kane
ATTORNEY

March 11, 1952 A. F. RUS 2,589,143

METHOD AND APPARATUS FOR REMOVING HEAT FUSIBLE MATERIAL FROM CANS

Filed Nov. 14, 1947 4 Sheets-Sheet 4

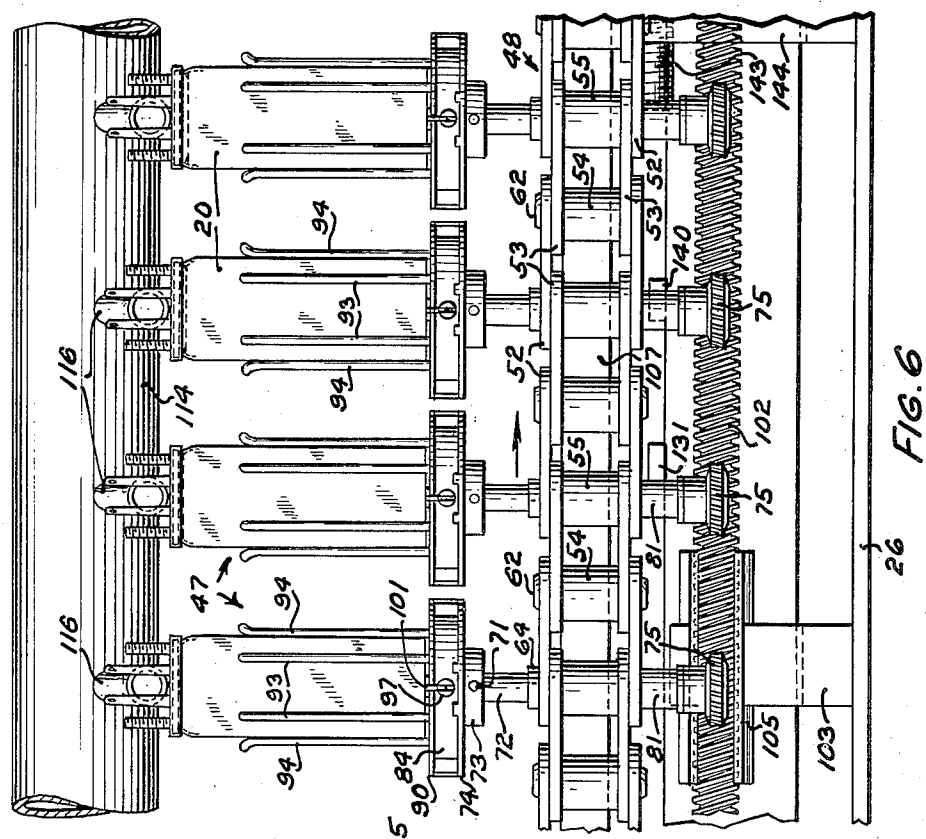


FIG. 6

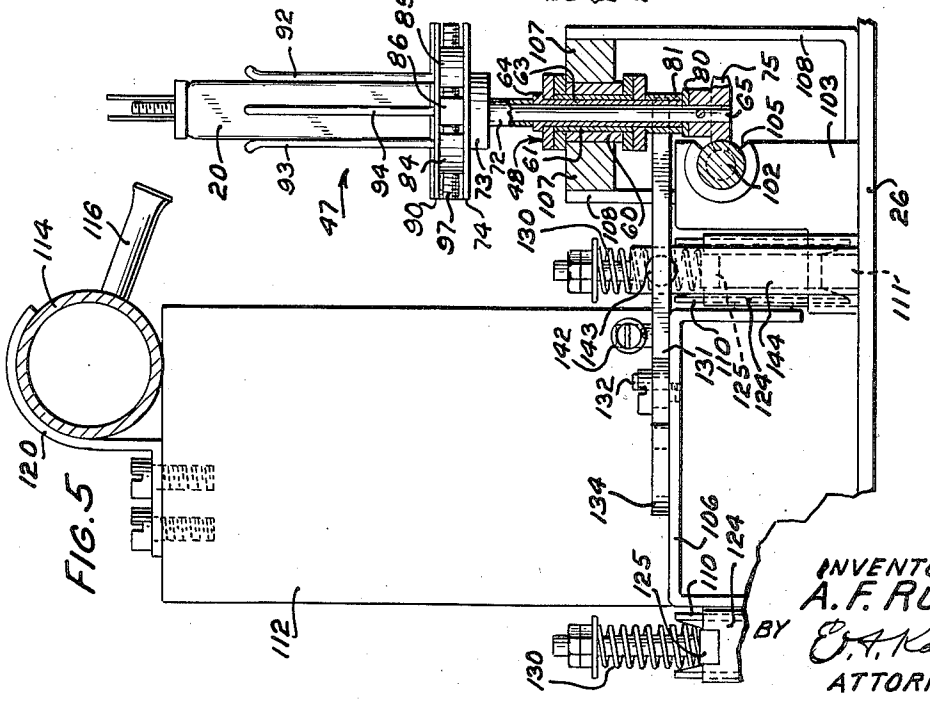


FIG. 5

INVENTOR
A. F. RUS
BY O. A. Kane
ATTORNEY

Patented Mar. 11, 1952 2,589,143

UNITED STATES PATENT OFFICE

2,589,143

METHOD AND APPARATUS FOR REMOVING HEAT FUSIBLE MATERIAL FROM CANS

Albert F. Rus, Chicago, Ill., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

Application November 14, 1947, Serial No. 786,018

13 Claims. (Cl. 226—22)

1

This invention relates to a method of and an apparatus for removing heat fusible material from cans.

In the manufacture of some condensers it is customary to pot the condenser in a can using wax or some other similar material to fill the spaces between the condenser and the interior walls of the can after the open end of the can is closed with a terminal plate. If the can is filled to the top with wax, use of the condenser in a warm spot would cause the wax to expand and be extruded from openings in the can. To avoid such occurrences it is necessary that a space be provided in the can to allow for expansion of the wax without causing messy extrusion of the wax.

It is an object of this invention to provide a method of and an apparatus for removing a portion of the sealing compound from potted electrical devices.

In accordance with one embodiment of this invention an apparatus and method are provided for partially dewaxing canned condensers wherein the condenser cans are held on rotatable fixtures mounted on an endless conveyor chain which at one section travels parallel with a reciprocable carriage having mounted thereon a hot air manifold provided with a plurality of hot air jets aimed at the tops of the passing condensers which are provided with small holes in their top surfaces. As the condensers are carried past the manifold the carriage with the manifold is reciprocated in a line parallel to the moving chain by being intermittently engaged by the chain and released therefrom thereby permitting a greater concentration of the hot air blast on each condenser. While the condensers are being carried past the hot air manifold the fixtures on which they are mounted are engaged by a mechanism which causes them to spin around a vertical axis. The hot air blasts first melt the wax at the upper end of the can and then aspirate a portion of the melted wax from within the condenser can which portion is then blown away together with any other wax accumulated on the outside of the can.

A complete understanding of the invention will be had by reference to the following detailed specification taken in conjunction with the accompanying drawings, in which

Fig. 1 is a side elevation partly in section of an apparatus embodying the features of the invention, the section being taken on the line 1—1 of Fig. 2;

Fig. 2 is a plan section with some parts in elevation of the apparatus shown in Fig. 1 taken on the line 2—2 of that figure;

2

Fig. 3 is a view showing most of the mechanical portion of the apparatus in front elevation and taken through a section of the hood on the line 3—3 of Fig. 2;

Fig. 4 is a partial plan sectional view of the apparatus shown in Fig. 3 partly in elevation and taken along the line 4—4 of Fig. 3;

Fig. 5 is a vertical sectional view of the apparatus shown in Fig. 2 taken along the line 5—5 of that figure;

Fig. 6 is a vertical section of the apparatus shown in Fig. 2 taken along the line 6—6 of that figure;

Fig. 7 is a plan view of one of the spinning fixtures which hold individual condensers;

Fig. 8 is a front elevation of the spinning fixtures shown in Fig. 7, the condenser in the fixture being shown in the condition which prevails after some of the wax has been aspirated;

Fig. 9 is a sectional view of a spinner taken along the line 9—9 of Fig. 8; and

Fig. 10 is a vertical sectional view, with parts shown in elevation, taken along the line 10—10 of Fig. 7.

In one method of the manufacture of condensers of the type indicated at 20 in the drawings, the electrical elements 21 (Fig. 8) are potted in wax 22 by placing them and a terminal plate 23 connected thereto into an open ended can 24 and crimping the open edge of the can around the terminal plate after which the can is thoroughly filled with molten wax under a substantial vacuum. The wax enters the can through holes 25 provided in the terminal plate. As a result of this operation the spaces in the can are filled with wax which extends up to the terminal plate in the interior of the can. During the cooling period, voids due to contraction of the wax are prevented by steps which provide a continuous influx of wax into the can during the cooling step. If nothing further is done such a condenser when subjected to abnormally high temperatures will extrude wax because of a lack of space within the condenser for expansion of the wax. The specific embodiment of the apparatus described herein is ideally suited for providing a space within a canned condenser to allow room for the expansion of wax by removing a portion of the wax from the canned condenser after it has been completely assembled and filled with wax.

As shown in the drawings the apparatus is supported by a rectangular base plate 26 mounted

on a frame 27. Secured to the base plate 26 adjacent three corners thereof are three vertically disposed spindles 30, 31 and 32 on which idler sprocket wheels 33, 34 and 35 are mounted for free rotation. The sprocket wheels are maintained in their vertical position by retaining collars 40, 41 and 42 secured to the spindles 30, 31 and 32, respectively. At the fourth corner, the base plate is provided with a sprocket wheel 43 securely fixed to a shaft 44 extending upward from a reduction gear box 45 which is secured to the base plate 26 and is coupled to a motor 46, which, through the gear box, imparts a relatively slow rotation to the sprocket wheel 43.

A plurality of rotatable article holding fixtures 47 are carried by a continuous conveyor formed by an endless sprocket chain 48 stretched around the sprocket wheels 33, 34, 35 and 43 in the form of a rectangle with the links of the chain engaging the teeth of the four sprocket wheels. It will be seen that rotation of the sprocket wheel 43 in the direction of the arrow 49 (Fig. 2) by the motor 46 will impart horizontal motion to the endless chain 48 in the direction of the arrows 50 and 51.

The sprocket chain 48 (Figs. 5 and 6) comprises a series of side links 52 and 53 and flexible joints 54 and 55 formed by concentric tubular cross members 60 and 61. Each of the joints 54 is provided with a solid pin 62 which extends through the hollow joint and is upset at each end. Instead of the solid pin 62, a bushing 63 having an annular flange 64 extends through the hollow portion of the joints 55 and provides a vertical bearing for a rotatable spindle 65 which carries an article carrying fixture 47 securely fixed to its upper end by a locking pin 71. To reduce friction and to maintain the fixtures 47 at a predetermined height a spacing sleeve 72 surrounds the spindle 65 between a projecting annular portion 73 of a circular base member 74 of the fixture 47 and the annular flange 64. Fixed to the lower end of the spindle 65 is a worm gear 75 which is separated from the lower end of the bushing 63 by a washer 80. A floating sleeve 81 engageable with a drag bar hereinafter described surrounds the lower end of the bushing 63 between the lower side of the chain and the washer 80.

The plate 74 carries gibs 82—82 which are slideably engaged by the walls of grooves 83—83 of two movable segments 84 and 85 thus to support the segments for movement toward and away from each other. Extending across the plate 74 between the two segments 84 and 85 is a spacer bar 86 which is fixed to the plate 74 and which has fixed to it a circular plate 90. The plate 90 has elongated slots 91—91 formed in it through which extend article gripping fingers 92—92 and 93—93 fastened to the segments 84 and 85. Additional article gripping fingers 94 are secured to the plate 90 to form with the other fingers an article holding nest. The segments 84 and 85 are provided with oppositely threaded coaxial apertures 95 and 96 in which is threaded a screw member 97 having right hand threads at one end and left hand threads at the opposite end. The center portion of the screw member 97 is movably disposed within an aperture 98 in the bar 86 and is restricted from longitudinal movement by a pair of fixed pins 99—99 passing through an annular groove 87 at the center of the screw member 97 and driven through the bar 86. Rotation of the screw member 97 operates to move the pairs of fingers

92—92 and 93—93 toward and away from each other so that the size of the nest formed by all the fingers may be preset to fit the condenser being operated on. A flat spring member 100 secured to the plate 90 is provided with a small key projection 101 which is engageable with the slotted end of the screw member 97 to lock it in an adjusted position after it has been rotated to effect any predetermined adjustment of the fingers 92—92 and 93—93.

Each of the worm gears 75 is engageable with a driving worm 102 extending parallel to that side of the conveyor chain 48 adjacent the front of the apparatus as shown in Figs. 3 and 4. The driving worm 102 is rotatably mounted in a plurality of bearings 103 secured to the base 26 and is driven by a motor 104. Slots 105 are provided in one side of the bearings to expose a portion of the driving worm in order to permit engagement between the driving worm and the worm gears 75 along the entire length of the driving worm. In order to ensure positive engagement between the worm gears 75 and the driving worm 102, a pair of parallel guides 107 supported by brackets 108 fixed to the base 26 are disposed on each side of the chain 48 along the front portion thereof.

Adjacent to the driving worm 102 and parallel to the conveyor chain 48 is a reciprocable carriage 106 mounted on flanged wheels 110 which ride on sets of rails 111 secured to the base 26 and parallel to the driving worm 102. Supporting uprights 112 and 113 on the carriage support a hot air manifold 114 connected at one end through a flexible pipe 115 to a source of hot air under pressure, not shown. Clamps 120 and 121 serve to hold the manifold rigid with respect to the supporting uprights 112 and 113. A plurality of flared-end jets 116 (Fig. 5) are provided on that side of the manifold 114 which is adjacent to the conveyor chain 48. The jets communicate with the interior of the manifold and are disposed at such an angle that they are aimed at articles carried by the fixtures 47.

A heavy coil spring 122 secured to the right end of the carriage 106 and to an anchor 123 on the base 24 exerts a continuous pull on the carriage urging it to the right (Figs. 2 and 3). Movement of the carriage 106 to the right (Figs. 2 and 3) is limited by a pair of columns 124 and braking arms 125 supported thereby under the pressure of springs 130. The columns 124 are fixed to the base 26 at the right end of the left set of rails 111 (Figs. 2 and 4) and carry the braking arms in position to resiliently engage the wheels 110.

Reciprocation of the carriage 106 is provided by a mechanism comprising a flat drag bar 131 (Fig. 4) pivotally connected near one end to the base of the carriage 106 and extending outwardly from the carriage to engage the floating sleeves 81 just above the worm gears 75 as they are carried to the left as shown in Figs. 2 and 3, and to the right as shown in Fig. 6, by the chain 48. At the beginning of the reciprocating cycle the lever 131 is locked in the position shown in full lines in Fig. 4 by a pin 132 secured to the base of the carriage 106 and an irregular shaped projection 133 at the end of one arm 134 of a bell crank lever 135 pivotally connected to the base of the carriage 106, the other arm 140 of the bell crank lever being connected to a spring 141 which is anchored to the base of the carriage 106 and which exerts a pull to the left (Fig. 4) on the end of the bell crank lever arm 140

thereby constantly urging the arm 134 of the bell crank lever toward the end of the drag bar 131. A spring 142 connected to the drag bar 131 and anchored to the base of the carriage 106 constantly urges the lever 131 to the right or clockwise (Fig. 4).

As the conveyor chain moves to the left (Fig. 4) the drag bar 131 is engaged by the floating sleeve 81 nearest the right side of the drag bar 131, and the lever 131 being locked, the carriage 106 will be moved by the chain 46 to the left a distance approximately equal to the space between two fixtures 47. When this position is reached (Fig. 4, dot and dash lines) the arm 140 of the bell crank lever 135 will strike the end of a stop screw 143 threaded into a post 144 secured to the base 26 whereupon the end of the arm 140 will be moved to the right against the action of the spring 141 thereby breaking the locking engagement between the projection 133 of the arm 134 and the drag bar 131. The spring 122 having more potential force than the spring 142, the carriage 106 will be snapped to the right (Fig. 4), the braking arms 125 acting to cushion the shock, and, after the drag bar 131 pivots and clears the sleeve 81 last engaged by it, the drag bar 131 will be pulled to the right by spring 142 and again locked in its original position by the bell crank lever 135 in which position it will be engaged by the next succeeding sleeve 81 to repeat the cycle of reciprocation.

Since it is desirable to melt only a small portion of the wax within the top part of the can it is necessary to keep the rest of the condenser relatively cool. This may be accomplished by covering a substantial portion of the apparatus with an exhaust hood 145 connected to a conduit 151 leading to an exhaust fan not shown (Fig. 1). For easy access to the apparatus under the hood a sloping cover 150 with hinges may be provided for the front part of the hood. The fixtures 47 on the conveyor chain 48 enter the hood through an opening 152 and leave the hood through an opening 153 which opens into a cooling chamber 154 adjacent to and communicating with the main chamber of the hood. After passing through the cooling chamber 154 the fixtures finally emerge from an opening 155 at the other end of the chamber. Operation of the exhaust fan draws the spent hot air from the hood and causes cool air to be sucked through the openings 152 and 155. The cool air drawn through the opening 155 passes through the cooling chamber into the hood through the opening 153 (Fig. 1) between the hood and the cooling chamber.

In the operation of the apparatus condensers to be dewaxed may be loaded onto the moving conveyor at any point of its travel outside of the hood. After the loaded fixtures 47 are carried into the hood, the worm gears 75 successively engage the rotating driving worm 102 thereby causing the fixtures 47 to spin on the spindles 65 as they move past the reciprocating manifold. Pressurized hot air from the manifold jets 116 is directed onto the upper portion of the condenser, the angle of the jets being such that the top of the condenser is swept by a current of hot air which after melting the wax at the top of the condenser can, within and without, aspirates a portion of the melted wax from within the can through the holes 25 (Figs. 7 and 8) provided for that purpose. The spacing of the jets is the same as the spacing between the axes of rotation of the fixtures 47 and the manifold is so related to the conveyor chain 48 that each jet is directed at the center of the top of the spinning condensers during the leftward movement of the reciprocating cycle (Fig. 3). The reciprocation of the manifold 114 causes each hot air jet to intermittently travel with each spinning condenser thus providing a greater concentration of hot air under pressure on top of the spinning condensers. It will be apparent that each condenser moving past the manifold is consecutively subjected to a sustained blast of hot air from each jet. The aspiration of the wax is more uniform and the space and the top level of the wax remaining within the condenser is more symmetrical due to the spinning of the condensers as they pass the manifold jets. In addition to aspirating wax from within the condenser the hot air blast also melts and blows away any other wax accumulated on the upper surface of the outside of the condenser. The dewaxed condensers then pass through the cooling chamber and may be removed from the fixtures after they emerge from the opening 155.

The embodiment described herein is designed to dewax cans on a mass production basis. However, it is entirely within the spirit and scope of the present invention to aspirate a portion of wax or other heat fusible compound from a single can provided with openings therefor by subjecting that surface of the can provided with holes to hot air under pressure for a sufficient length of time to first melt a portion of the wax and with a continuation of the same current of hot air to aspirate the melted wax through the holes provided therefor in the can. As was pointed out before, the removal of the wax is more uniform and the space resulting therefrom is more regular and symmetrical if, while being subjected to the pressurized hot air, the can is spun around an axis. For example, if the motor 46 is stopped and the conveyor chain 48 remains stationary a single condenser can could be dewaxed by placing it in one of the fixtures 47 disposed next to the manifold 114 and in line with one of the jets 116. The can may then be subjected to a stream of hot air from the jet stationed nearest thereto for a sufficient length of time to melt and aspirate a portion of the wax during which time the fixture holding the condenser may be rotated to spin the can by means of the worm gear 75 and the rotating driving worm 102.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. A method of removing heat fusible compound from a container having an apertured surface therefor comprising directing a stream of hot air on said surface and across the aperture therein to melt a portion of the compound within the can and continuing said stream of hot air on and across said aperture for a sufficient length of time to aspirate a desired portion of said melted compound through the aperture in said surface.

2. A method of removing heat fusible compound from a container having an apertured surface therefor comprising spinning said container around an axis passing through said surface at an angle thereto, simultaneously directing a stream of hot air on and across said surface for a sufficient length of time to melt a portion of

the compound within the container and continuing said stream of hot air on and across said surface for a sufficient length of time to aspirate a desired portion of the melted compound from within the container.

3. The method of removing a heat fusible sealing material from a container having an aperture therein which comprises moving the container through a fixed predetermined path, imparting rotation to the container while traveling in said path, applying a blast of hot air onto the container and across the aperture therein during its travel in said path and while being rotated, and flowing a coolant about the container to restrict the heating effect to the portion thereof adjacent the aperture.

4. The method of removing a heat fusible sealing material from a container having an aperture therein which comprises moving a container through a fixed path, imparting rotation to said container during a portion of its movement in said fixed path, continuously applying a jet of hot air tangentially of the aperture in the container during that portion of the travel of the container where it is being rotated and flowing cool air about the container during its travel to restrict the heating effect of the jet of hot air to a selected portion of the container thereby to liquify and aspirate a predetermined amount of the heat fusible material from the container.

5. A method of removing heat fusible material from a can having an apertured surface comprising heating a portion of the can to melt a portion of the material within the can, spinning said can about an axis extending through said surface at an angle thereto, and directing a current of hot air across the apertured surface of the spinning can to aspirate some of the melted material from within the can.

6. A method of removing excess heat fusible sealing material from a container having an aperture in one of its walls comprising applying a jet of hot air onto said container in the area of said aperture to heat selected portions of said container to fuse a portion of the sealing material, rotating said container, and applying a coolant to other portions of the container to aid in restricting the heat to said selected portions.

7. An apparatus for removing heat fusible compound from cans comprising a conveyor, means for moving said conveyor, a rotatable can holding fixture carried by said conveyor along a predetermined path, a movable air jet disposed along said predetermined path, said jet being adapted to be connected to a source of hot air under pressure and to direct a stream of hot air on and across a can in said fixture as it is carried past the jet by the conveyor, means for moving said jet while trained on said can in unison with said conveyor for a predetermined distance, and means for rotating said fixture while moving through said predetermined distance.

8. An apparatus for melting and aspirating heat fusible compound from within cans, said apparatus comprising a conveyor movable in a predetermined path, means for moving said conveyor, a plurality of spaced apart can holding fixtures supported and carried by said conveyor in said predetermined path, a movable air jet connectible to a source of hot air under pressure and directed across said predetermined path, means for reciprocating said air jet in a line parallel to said predetermined path, said jet travelling in unison with said conveyor during one part of the cycle of reciprocation, and means for

rotating said fixture during said one part of the cycle of reciprocation.

9. An apparatus for melting and aspirating heat fusible compound from within cans, said apparatus comprising an endless conveyor movable in a predetermined path, means for moving said conveyor, a plurality of rotatable can holding fixtures carried in spaced relation by said conveyor, a hot air manifold having a plurality of spaced apart nozzles connectible to a source of hot air, said nozzles being adapted to direct a stream of hot air across said predetermined path, means associated with said conveyor for reciprocating said manifold within predetermined limits in a line parallel to said predetermined path, each of said nozzles being directed at and travelling in unison with a separate one of said can holding fixtures during one part of the cycle of said reciprocation, and means for spinning said fixtures as they are carried between said predetermined limits.

10. An apparatus for removing heat fusible compound from within cans having an apertured portion, comprising a plurality of rotatable can holding fixtures carried in spaced relation by a moving conveyor, a movable hot air manifold having a plurality of jets and adapted to be connected to a source of hot air under pressure, means to reciprocate said manifold along a line parallel to the line of travel of said conveyor and in timed relation therewith so that during that part of the reciprocating cycle in which the manifold travels in the same direction as the moving conveyor that part of the manifold's movement will be at the same speed as that of the moving conveyor and each jet will be trained on and travel with a can being carried by the conveyor, and means for rotating said fixtures during said part of the reciprocating cycle of the manifold.

11. An apparatus for aspirating liquified heat fusible compounds from cans having an apertured wall comprising a conveyor, a plurality of rotatable can holding fixtures mounted on rotatable spindles carried by said conveyor, a worm gear fixed to each of said spindles, means for moving said conveyor in a predetermined path, a plurality of hot air nozzles connectible to a source of hot air and mounted on a movable support, said nozzles being directed to flow streams of hot air across said predetermined path, means associated with said conveyor for moving said support from a first position to a second position, means for restoring said support to said first position, a driving worm for engaging said worm gears between said first and second position to spin said fixtures, and means for imparting rotation to said driving worm.

12. A method of removing heat fusible compound from within a closed container having an apertured surface, which comprises spinning said container around an axis extending through said apertured surface at an angle thereto, melting a portion of the compound within the container adjacent the apertured surface, and directing a stream of hot air onto said surface and across said aperture to aspirate a portion of said melted compound.

13. A method of removing heat fusible compound from within a closed container having an apertured surface which comprises positioning the container with the apertured surface uppermost, heating the upper portion of the container to melt the upper portion of the compound within the container, and directing a stream of

hot air onto the apertured surface of the container and across the aperture therein to aspirate a portion of the melted compound.

ALBERT F. RUS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,492,925	Knight	May 6, 1924
1,516,343	Knight	Nov. 18, 1924
1,835,676	Scholz et al.	Dec. 8, 1931
2,309,568	Bell	Jan. 26, 1943
2,409,341	Borg	Oct. 15, 1946
2,433,051	Jonas	Dec. 23, 1947