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METHOD OF SPRAYING CONE TOPS

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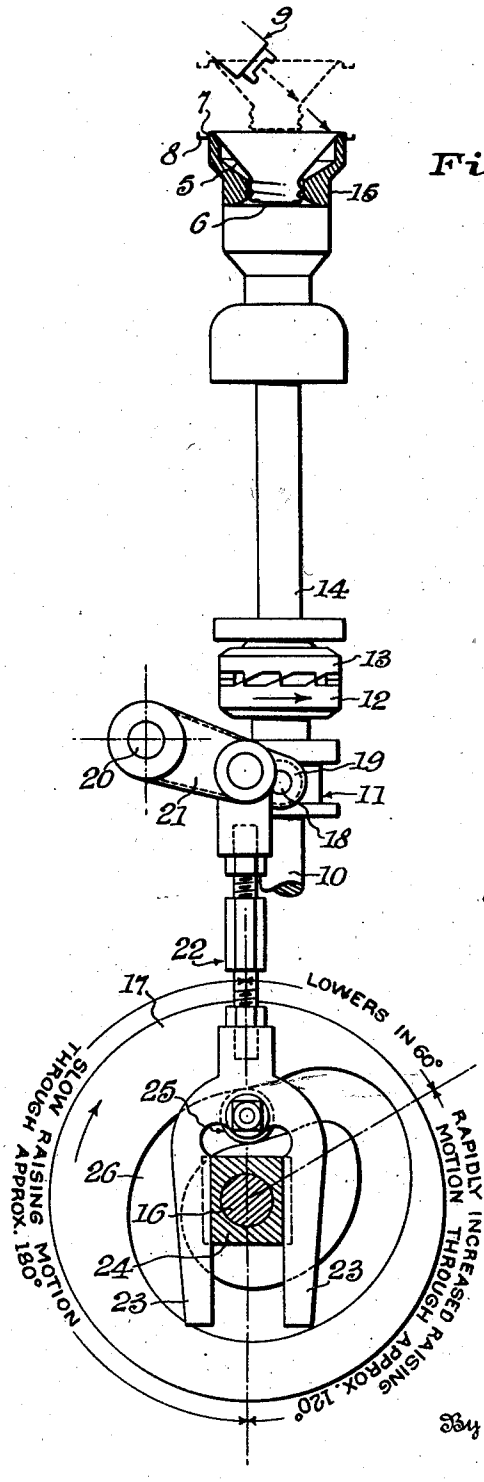
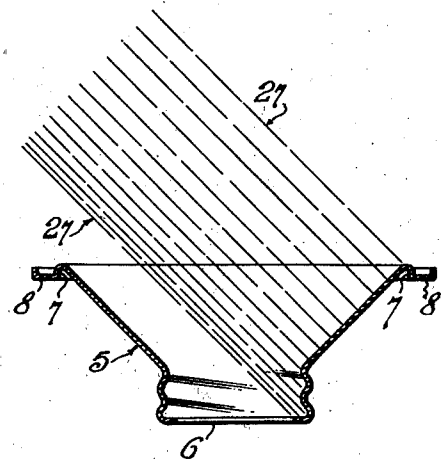


Fig. 1.

Fig. 2.



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METHOD OF SPRAYING CONE TOPS

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4 Claims. (Cl. 117—104)

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The invention relates generally to the art of coating and primarily seeks to provide a novel method by the practicing of which the cone tops intended to be assembled on can bodies, or comparable coniform surfaces, can be rapidly and efficiently given a protective surface coating despite the coniform shape thereof.

In the spray coating of containers or like articles the method of rotating the articles while applying a spray coating to surfaces thereof has been commonly practiced but these articles have had surface areas which were so shaped that no difficult problems have been presented in applying to these surfaces a coating of satisfactory uniform thickness. When it is attempted to coat articles of irregular shape and varying diameters, such as the cone tops which are commonly affixed to the upper ends of certain forms of containers, difficult problems are presented in attempting to apply coatings of uniform thickness at all portions of the coniform surfaces. When it is attempted to spray such coniform surfaces in the usual manner of directing a concentrated spray from a stationary spray nozzle onto a small area of a surface being moved relatively to the nozzle, or from a moving spray nozzle onto a stationary surface, it is impossible to move the spray longitudinally at a uniform rate relative to the axis of the rotating cone, or to move the rotating cone at a uniform rate in the direction of its axis relative to a stationary spray, because when it is attempted to do so the all over surface coating resulting from the merging of the spirally applied concentrated spray will be nonuniform in thickness, said coating increasing in thickness toward the small diameter mouth portion of the cone top because of the gradually decreasing area provided at that portion of the cone top on which to receive the spray coating being applied at a uniform rate.

Therefore, it is a primary object of the present invention to provide a novel method of spraying cone tops which consists in presenting the cone tops and the coating applying spray in cooperative relation, imparting rotation to the cone top, and causing the spray to move along the axis of the rotating cone top, or the cone top to move in the direction of its axis relative to the spray at gradually increasing speed as the mouth or small diameter portion of the cone top is approached by the spray, thereby to cause the all over surface coating resulting from the merging of the concentrated spray thus spirally applied to be of uniform thickness throughout the interior surface of the cone top.

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With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims, and the several views illustrated in the accompanying drawing.

In the drawing:

Figure 1 is a somewhat diagrammatic face view and part vertical section illustrating the means for supporting the cone top, and for rotating and lifting and lowering the same in cooperative relation to the spray member.

Figure 2 is a diagrammatic view illustrating a cone top and relative progressive spray positions attained during the spray coating of the coniform internal surface thereof.

This application constitutes a continuation in part of the copending application for U. S. Letters Patent, Serial No. 442,090, filed May 7, 1942, and which eventuated into U. S. Letters Patent 2,390,457 on December 4, 1945.

The parent application above referred to discloses apparatus for internally spraying cone tops. This apparatus embodies a turret having thereon a plurality of rotatable chuck spindles, a chuck cup on each spindle for removably holding a cone top in position to be sprayed, a cone top body spraying station, a cone top heel spraying station, means for indexing the turret to successively present the chucks at a cone top receiving station, at the two spraying stations, and at a sprayed cone discharge station, means at the receiving station for feeding and applying cone tops to the chucks, means at the respective spraying stations for imparting rotation to the chuck cups and cone tops and for imparting lifting and lowering movement to the chuck cups and cone tops relative to the spraying means to provide for uniform coating of the cone tops, and means at the discharging station for discharging the sprayed cone tops.

In its more specific sense, the present application has to do with a method of spraying the internal coniform surfaces of the cone tops, although it also comprehends the broader purpose of providing a uniform surface coating on coniform surfaces on parts other than cone tops, and also on internal or external coniform surfaces.

In the present somewhat diagrammatic illustration of the invention, the coniform surface to be coated in the practicing of the invention is provided on a cone top comprising a coniform body 5 having a center opening or pouring mouth 6 at its small or apex end and merging into a generally cylindriform heel portion 7 at its large

diameter or base end, said heel portion merging into an outwardly extended flange 8, which is to be utilized in the attachment of the cone top to a can body in the manner well known in the art of manufacturing metallic receptacles. In the parent application, above referred to, means is disclosed for effecting the spray coating of the internal coniform surface of the cone top body 5 at one station, and the spray coating of the heel portion 7 at another station. The present invention is concerned only with the method of spray coating the coniform surface.

In Figure 1 is somewhat diagrammatically illustrated means for supporting the cone top while it is being sprayed, and also for imparting the necessary rotation of the cone top and the movement thereof in the direction of its axis and relative to the stationarily mounted spray head or member generally designated 9. In this disclosure the movement in the direction of the axis of the coniform surface being coated is imparted to the cone top, but it is to be understood that the invention broadly comprehends the bringing about of relative movement between the cone top or coniform surface and the spray member, whether it be by movement of the cone top relative to the stationary spray member, or by movement of the spray member relative to the rotating cone top.

In the said Figure 1, there is included a vertically disposed, power driven rotary shaft 10 which rotates freely in an annularly grooved collar or lifter head 11 and is subject to being lifted and lowered by upward or downward movement imparted to said head. At its upper end the shaft 10 carries a toothed driving head 12, these parts being disposed at the spraying station of the apparatus of the parent case whereat a spray coating of uniform thickness is to be applied to the internal coniform surface of the cone top.

Each time the turret, hereinabove referred to as constituting a part embodied in the parent application disclosure, is indexed it presents a toothed driver head 13 in centered relation immediately over the previously mentioned driver head 12. A spindle 14 is secured to and projects vertically from the driver head 13 and carries a chuck cup 15 at its upper end, said cup having a generally coniform recess therein for receiving the cone top body with the heel portion 7 thereof embracing the upper peripheral edge of the cup in the manner illustrated in Figure 1. It will be obvious that by lifting the shaft 7, the heads 11 and 12 will be caused to interengage so as to impart rotation to the spindle 14 and the cone top carried at the upper end thereof, and lifting and lowering movement imparted to the shaft 10 also will be imparted to the spindle 14 and the cone top carried thereon.

In Figure 1 there is diagrammatically illustrated one example of means for bringing about the desired relative movement between the spray member 9 and the coniform surface to be sprayed, in this instance the internal surface of the cone top 5, in the direction of axis of the rotating coniform surface and at a rate gradually changing reversely as the rate of change in diameter of said coniform surface gradually changes at the portion thereof against which the spray is directed, that is to say as the diameter of the coniform surface gradually increases toward the base the rate of relative movement in the direction of said axis gradually decreases, and as the diameter of the coniform surface gradually decreases toward the apex the rate of relative movement in the direction of said axis gradually increases, thereby to provide a spray coating of substantially uniform thickness throughout the coniform surface area to be spray coated. In the specific example disclosure herein made, the spray member 9 is stationary and the coniform surface is moved relative thereto at a rate gradually accelerated in degree corresponding to the graduality of the decrease in diameter of the coniform surface, the initial engagement of the spray with the coniform surface being at the larger or base diameter thereof, thereby to gradually decrease the amount of applied spray coating accordingly as the area to be spray coated decreases.

In the movement imparting and controlling means illustrated in Figure 1 there is included a power driven shaft 16 and a grooved cam 17 fixed thereon. The lifter head 11 has trunnion connection as at 18 with an actuator crank 19. The crank 19 is secured on a rockably mounted shaft 20, and another crank 21 is secured on said shaft and connected to the upper end of an adjustable thrust link 22 having a fork 23 at the lower end thereon remote from said connection with the crank 21. The fork 23 is disposed to straddle a block 24 mounted on the cam shaft 16 and is equipped with a roller 25 which is engaged in the groove 26 of the cam 17. It will be obvious by reference to Figure 1 of the drawing and the legends applied thereon that the cam groove 26 is so shaped as to impart to the link 22 and connected parts a slow raising motion throughout 180° of its rotation, followed by a rapidly increased raising motion throughout approximately the next 120° of its rotation, and a rapid lowering motion throughout the remaining 60° of its rotation.

By thus rotating the cone top and simultaneously lifting the same at a gradually increasing rate of lift, the rate of lift will increase accordingly as the diameter of the portion being sprayed, and consequently the area being sprayed, decreases, thereby providing a uniform coating throughout the whole of the internal area of the cone top. In other words, the cone top 5 is slowly lifted as the spray strikes the large diameter thereof near the base, and the speed of lift gradually increases as the diameter of the coniform surface decreases toward the pouring mouth 6 thereof. This progressive rate of lift and uniform spraying is diagrammatically indicated in Figure 2 by the varied spacing of the spray lines 27. As before stated, after the spraying of the internal surface of the cone top has been completed, the chuck spindle is rapidly lowered.

While an internal spraying of the cone top by movement of the cone top relative to the stationary spray has been described in this example disclosure, it is to be understood that the external surface of a cone top, or any internal or external coniform surface may be uniformly coated by practicing the herein described invention, either by moving the surface in a direction of its axis relative to a stationary spray member, or by moving the spray member in the direction of the axis of and relative to a rotating coniform surface.

We claim:

1. The herein described method of coating generally coniform surfaces which consists in imparting rotation to the coniform surface while directing a spray of coating material against the rotating generally coniform surface, and moving said surface in the direction of its axis relative to the spray at a rate gradually changing reversely as the rate of change in diameter of said

surface gradually changes, thereby to provide a spray coating of substantially uniform thickness throughout the area to be spray coated.

2. The herein described method of coating generally coniform surfaces which consists in imparting rotation to the coniform surface while directing a spray of coating material against the rotating generally coniform surface at the largest diameter thereof, and moving said surface in the direction of its axis and relative to said spray at a rate gradually accelerated in degree corresponding to the graduality of the decrease in diameter of said surface, thereby to gradually decrease the amount of applied spray accordingly as the area to be sprayed decreases and provide a spray coating of substantially uniform thickness throughout the area to be spray coated.

3. The herein described method of spray coating a generally coniform surface on a member which comprises, rotating the coniform surface about its axis, supporting said member and a spray head in cooperative relation for directing a spray of coating material from said spray head against said rotating surface, and moving said member in the direction of the axis of the rotating coniform surface and at a rate gradually changing reversely as the rate of change in diameter of said coniform surface gradually changes, thereby to provide a spray coating of substantially uniform thickness throughout the coniform surface area to be spray coated.

4. The herein described method of spray coating a generally coniform surface on a member which comprises, rotating the coniform surface about its axis, supporting said member and a spray head in cooperative relation for directing a spray of coating material from said spray head against said rotating surface at a large diameter portion thereof, and moving said member in the direction of the axis of the rotating coniform surface and at a rate gradually accelerated in degree corresponding to the graduality of the decrease in diameter of said coniform surface, thereby to gradually decrease the amount of applied spray coating accordingly as the area to be spray coated decreases and provide a spray coating of substantially uniform thickness throughout the coniform surface area to be spray coated.

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