Dec. 9, 1952 J. F. BANNER 2,620,768

APPARATUS FOR APPLYING SURFACE COATINGS

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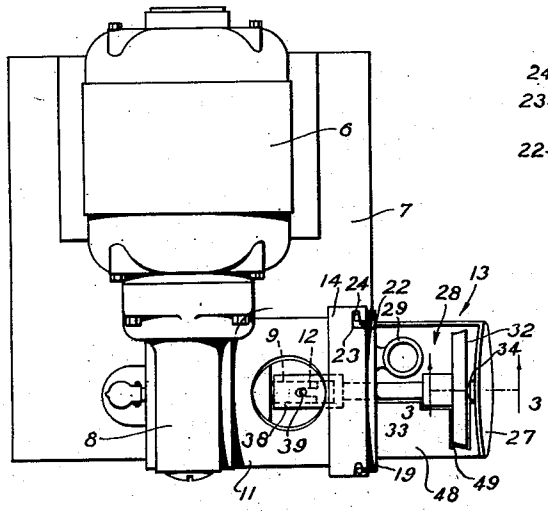


Fig. 1

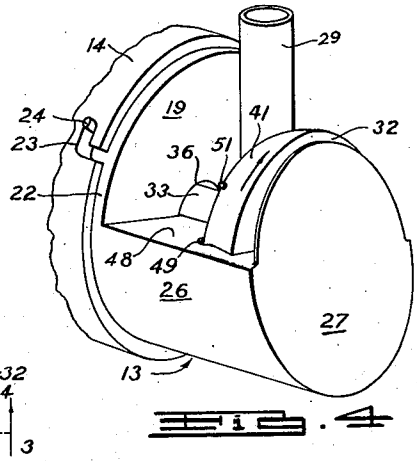


Fig. 4

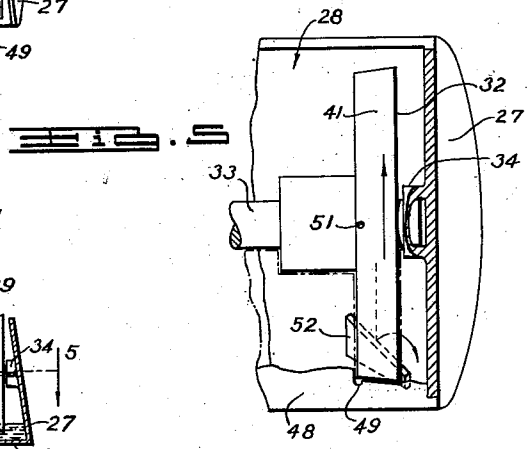


Fig. 5

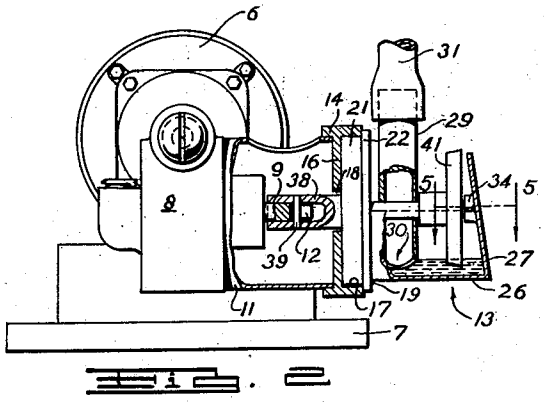


Fig. 2

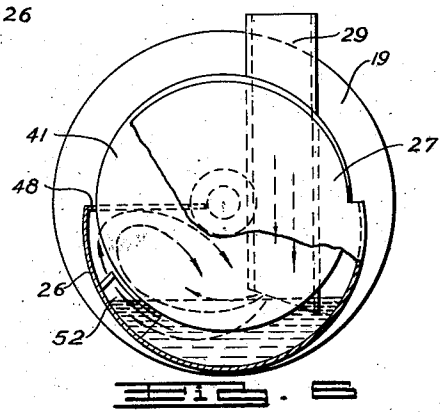


Fig. 6

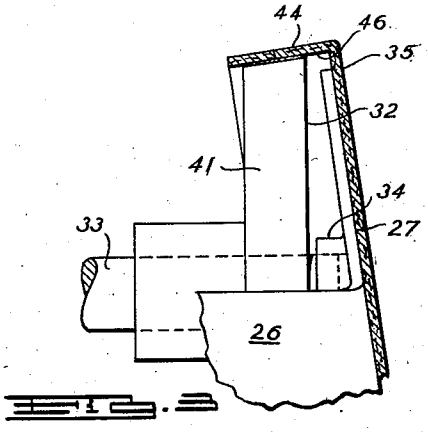


Fig. 3

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APPARATUS FOR APPLYING SURFACE COATINGS

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5 Claims. (Cl. 118—233)

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This invention relates to mechanisms and a method for depositing liquid adhesive on articles such as cap members used to form closures for tubular containers and the like.

An object of the invention is to provide a machine of the character described capable of very rapidly applying an unbroken annular bead of liquid adhesive on the inner peripheral surface of the rim flange of a carton cap while the cap is retained in full possession of the hand of the machine operator.

Another object of the invention is to provide, in a machine of the type referred to, an adhesive transfer unit capable of bodily insertion into a cap held manually in proximity thereto and provided with a rotor having a peripheral surface exposed to adhesive in the transfer unit to be applied to the internal flange surface of the cap and being arranged to carry multiple bands of adhesive having different consistencies, one band providing for tractional interengagement between the rotor and cap whereby the latter will be rotated in response to movement of the rotor to effect application of a sealing layer of adhesive to the cap flange in a zone thereof apart from the zone in which tractional engagement between the rotor and cap takes place.

A further object of the invention is to provide, in a machine of the class described, an adhesive transfer and applicator head unit designed to enter and hold a closure cap in proper positional relation with the adhesive applying element of the unit.

Still another object of the invention is to provide, in adhesive applying apparatus of the type referred to, a housing having a transfer chamber adapted to hold a prescribed quantity of adhesive and provided with an applicator rotor partially immersed in the adhesive and for withdrawing initial quantities of the latter in a film adhering to the periphery of the rotor to be brought into engagement with the internal rim flange surface of a closure cap held over and engaging the rotor, the said housing having a portion thereof cooperative with the rotor to shape a radially thickened bead of secondarily withdrawn adhesive in said film and in a prescribed peripheral zone of the rotor and said housing further having another portion thereof also cooperative with the rotor for directing flow of adhesive in the transfer chamber so as to effect desirable distribution of the adhesive relative to the rotor.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawing accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawing and description may be adopted within the scope of the invention as set forth in the claims.

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Referring to the drawing:

Figure 1 is a top plan view of an adhesive applying machine showing the improved mechanism of my invention associated therewith.

Figure 2 is a front elevational view, partly in vertical section of the structure illustrated in Figure 1.

Figure 3 is an enlarged vertical sectional view of the applicator rotor showing the cooperative relationship of the carton cap therewith. The plane in which the view is taken is indicated by the line 3—3 of Figure 1.

Figure 4 is an enlarged perspective view of the transfer chamber housing and rotor and showing particularly the adhesive bead former and the rotor-driven clearance element therefor.

Figure 5 is an enlarged horizontal sectional view taken in the plane indicated by the line 5—5 of Figure 2 and showing the adhesive deflector vane cooperative with the applicator.

Figure 6 is an enlarged side elevational view of the adhesive transfer housing unit shown in Figure 2, portions of the view being broken away so as to more clearly disclose details of internal construction.

In the operations of applying peripherally flanged cover caps to tubular cartons and the like to form end closures for the latter it has been the practice to manually smear quantities of liquid adhesive on the internal peripheral wall surface of the cap rim flanges and then to place the caps in engagement with the cartons and telescoped over the ends thereof. As often occurs, due to carelessness on the part of the operator or as a result of forced production speed failure to provide a complete or adequate coverage of adhesive on the cover rim surface may result in incomplete or insecure bonding of the cap to the carton so that when the latter is subsequently filled, with very fine powder or other such material difficult to confine, or is later handled after filling, considerable sifting and loss of material from the carton through the unsealed interstices may occur. In order to insure proper sealing of each carton as it is assembled the operator must visually inspect each cap after adhesive has been applied to make sure that the latter has been

evenly distributed and is present in sufficient quantity to effect secure adhesion of the cap to the carton. The requirement for such careful scrutiny of each cap unduly hinders production efficiency. Another objectionable feature inherent in the presently practiced method of cap attachment is the tendency of the operator to apply an excessive amount of adhesive to the cap which, when the latter is placed on the carton, squeezes out to run along the inner or outer surfaces of the latter and either causes adherence thereto or contamination of material which may be placed in the cartons or to cause relative adherence of cartons which may be grouped together. I have provided simple and efficient mechanism capable of operating at the top production speed of the operator and which not only insures complete coverage with adhesive of the carton surface but also maintains the rate of delivery of adhesive at such a degree that only sufficient of the latter will be deposited to insure the provision of a secure and fully sealed joint between the cap and carton. A very important additional advantage provided in the mechanism of my invention is the complete protection afforded to the operator's hands against contact with the adhesive which has been recognized as a cause of dermatitis.

In the form in which I have chosen to illustrate my invention I provide suitable rotary drive means here shown as an electric motor 6 mounted on support means 7 and connected through suitable reduction gearing 8 with an axially horizontal drive shaft 9, arranged concentrically within a cylindrical extension 11 of the gear reduction housing, and provided with a suitable coupling element here shown as a notch 12 formed in, extending transaxially across, and opening at the distal end thereof. An adhesive distributor and applicator is provided, generally indicated by the numeral 13, which is preferably fitted with quickly releasable and engageable attachment means whereby the unit 13 may be mounted on or detached from the housing extension 11. As here shown, the outer end of the housing extension is fitted with a concentric collar 14 having a diametrically extending wall member 16 intermediate its ends forming the bottom of an outwardly opening mounting socket 17 and further having a central opening 18 somewhat larger than and aligned concentrically with the drive shaft 9. One end of the adhesive distributor and applicator is provided with a plate member 19 diametrically reduced in a portion thereof to form a plug element 21 complementary with and capable of snugly entering the mounting socket 17, the plate member further having thereon a peripheral flange 22 capable of engaging the transaxial end surface of the housing extension 11 to limit the degree of entry of the plug element 21 into the mounting socket 17. Quick-acting means for effecting attachment and detachment of the unit 13 are provided in one or more bayonet type latches each of which comprises an L-shaped notch 23, formed in and opening at the end of the housing extension 11, which is engaged by a pin 24 mounted in and extending radially from the periphery of the plug element 21.

Carried by the plate member 19 and extending axially therefrom is a semi-cylindriform plate member 26 attached to the outer transverse edge of which is an eliptically-shaped end plate 27 upwardly angularly inclined toward the member 19 and providing a gauging element as will be presently explained. The plate member 26 and the end plates 19 and 27 together define a chamber 28 into which controlled quantities of liquid adhesive may be admitted through a level regulating tube 29 preferably secured to the exposed vertical face of the plate member 19, having a bottom opening 30 disposed in a plane rising toward the forward part of the chamber 28 and connected by a gravity feed hose 31 or the like with a suitable overhead adhesive reservoir not shown for purposes of conserving space in the drawing. The opening 30 has its highest point disposed at a prescribed point above the bottom of the chamber 28 so as to provide in the latter a constant mass of liquid adhesive of predetermined depth the level of the mass being maintained, as is well known, by the valving action of the liquid on the high point of the opening 30, replacement liquid being admitted from the overhead reservoir as and when quantities of the liquid are dispensed from the chamber.

Arranged adjacent and inwardly of the inclined end plate 27 is a circular rotor 32 secured to and rotatable with a shaft 33 one end of which is journaled in a sleeve bearing 34, carried by the inner face portion of the former end plate, and the other end of which extends through a clearance aperture 36 formed in the member 19 and is suitably connected at its distal extremity with a sleeve coupling 38 slidable engageable over the end of the drive shaft 9 and having a transaxially disposed clutch pin 39 capable of engagement in the drive shaft notch 12 so as to releasably lock the drive shaft and its extension shaft 33 together for corresponding rotational movement. The peripheral surface 41 of the rotor 32 is of frusto-conical form and the axial plane of the surface lies substantially at right angles with the face plane of the inclined end plate 27. It will be particularly noted in Figure 3 that when a carton cap 35 is placed against the outer face of the end plate 27 with the rim flange 44 of the cap extending over the rotor 32, a portion of the flange inner surface 46 will lie flush and tangential with the rotor.

As the rotor 32 is rotated by the drive shaft 9 when the latter is actuated by the drive motor 6, liquid adhesive will be picked up since the rotor is immersed in its bottom portion in the liquid and the latter will be carried upwardly and forwardly of the chamber in a circulatory movement. As a means for regulating the amount of adhesive carried around with the rotor in each cycle of rotation thereof the upper frontal half of the open top of the chamber is provided, as best shown in Figure 4, with a cover plate 48 preferably secured along its forward edge to the edge of the plate member 26 and along its side edges with the plate member 19 and end plate 27, the inward edge of the cover plate being contoured to lie in peripheral contiguity with the shaft 33, and in closely adjacent relation with the opposite sides of the rotor and with the periphery 41 of the latter. As will be seen in Figure 4, the periphery of the rotor 32, as indicated by the direction arrow, moves upwardly out of the chamber and the mass of adhesive therein toward the underside of cover plate 48 so that excessive adhesive clinging to the rotor will be swept therefrom back into the chamber by the portions of the cover plate immediately adjacent the rotor surfaces with the result that a very thin coating of adhesive will remain clinging to the rotor particularly the periphery 41 thereof as the latter emerges up-

wardly out of the chamber. A somewhat thickened bead of adhesive will be deposited on the rotor due to the provision in the cover plate of a contoured notch 49 located preferably adjacent the junction of the periphery 41 with the lesser transaxial face of the rotor. To insure that the notch 49 is maintained in a clear condition and is not partially or totally clogged by air hardened adhesive, the rotor is provided with a radially extending tooth 51 capable of passing through the notch during each revolution of the rotor. Thus a bead of fresh adhesive is constantly maintained on the rotor periphery 41.

As the rotor 32 constantly revolves into and out of the distributing chamber and through the circulating mass of adhesive maintained therein, the comparatively thin layer of adhesive overlying the rotor periphery at the larger end thereof will become quite tacky. Thus if a carton cap 35, loosely cupped in the operator's hand with the finger tips lightly engaging the outer surface of the rim flange, is placed over the adhesive applicator unit and is moved downwardly sufficiently to cause engagement between the rotor and the cap flange inner surface 46, the tacky layer of adhesive overlying the rotor will effect tractional engagement between the rotor and cap with the result that the latter will be caused to rotate in correspondence with the rotational movement of the rotor. As such rotation of the cap takes place, the radially thickened bead of adhesive present on the rotor will be transferred in an annular coating to a prescribed peripheral area of the cap flange inner surface 46 with the result that when the cap is removed from the adhesive applicator unit and telescoped over the end of a carton body, a complete ring of adhesive will be disposed between the relatively engaged surfaces of the carton body and closure cap thereby resulting in the provision of a full and tight seal between the connected parts. Due to the fact that the inner transaxial face of the carton cap engages the outer face of the end plate 27 as the cap is placed over the adhesive applicator unit, the zone of application of the sealing bead of adhesive on the rim flange surface 46 will be uniformly located in each successive carton cap.

Ordinarily due to the close conformity of the periphery of the rotor to the inner wall surface of the chamber 28 and the consistency of the adhesive there will be a tendency for the rotor to set up in the chamber a circuitous flow of fluid from the tube opening 39 longitudinally along the chamber bottom to the adjacent rotor face, the rotor thereupon carrying the adhesive upward along the curving wall of the member 26 against the underside of the cover plate 48. As the latter occurs, the flow will be deflected in a reverse direction longitudinally of the chamber and downwardly to complete the circuit at the opening 39. In order to assure that an adequate supply of adhessive and a continuous circulation thereof will be provided to the space between the rotor face and the end plate 27 I provide in the bottom of the chamber a fixed deflector plate 52 angularly arranged with reference to the rotor rotation so that adhesive will be intercepted in the circuitous flow thereof and will be directed across the rotor periphery and into the aforementioned space.

From the foregoing description of my invention it will be seen that I have provided an adhesive applying machine which permits an operator to simultaneously usefully employ both hands in applying adhesive to the cover cap, in handling the carton body and in relatively joining the carton parts, which uniformly applies an adequate amount of adhesive to the cap to insure secure sealing thereof to the carton body, which is capable of automatically rotating the carton cap in the operation of applying adhesive thereto without requiring any action on the part of the operator other than holding the cap in engagement with the adhesive applicator unit, which is capable of being readily cleaned by the simple operation of detaching the head and immersing the latter in a bath of water or other solvent, depending on the character of adhesive employed and which practically eliminates entirely the exposure of operators to dermatitis.

I claim:

1. In apparatus for applying coating material to the inner peripheral surface of a flange member, an applicator unit having a chamber for containing a quantity of liquid adhesive, a rotor applicator journalled on a horizontal shaft in said chamber and having a portion engaged in the adhesive in said chamber for imparting circuitous flow to said adhesive and for carrying quantities of adhesive from the chamber, means forming a wall of said chamber for positioning said surface of the member relative to said applicator and to receive adhesive material therefrom when said member is held adjacent said applicator, the plane of said means being angularly disposed to the plane of the end wall of said rotor, drive means connected with and to move said applicator for transferring adhesive material from the latter to said surface of the member, and means for arranging a quantity of adhesive on the periphery of said applicator to form a coating thereon of tacky consistency capable of tractional engagement with said surface so as to establish driving connection between said applicator and member.

2. In apparatus for applying coating material to the inner perpheral surface of a flange member, an applicator unit having a chamber for containing a quantity of liquid adhesive, the height of said chamber being less than the diameter of said flange member, an applicator comprising a circular rotor journaled on said unit and having a portion engaged in the adhesive in said chamber so as to institute circuitous flow in said adresive and to dispense adhesive from said chamber when the rotor is rotated, said rotor having a substantially frusto-conical periphery, means for rotating said rotor, said rotor further having a substantially vertically disposed end wall, means on said unit and cooperative with said rotor for forming on the latter separate zones of adhesive having different characteristics, means on said applicator unit engageable by said member for positioning said surface of the latter in prescribed relation to the said zones of said rotor, said means lying in a plane angularly related to said vertically disposed end wall and sloping towards the uppermost portion of said rotor at an angle with respect to said wall substantially equal to the angle of said rotor periphery, and said adhesive in one of said zones being capable of establishing tractional engagement between said rotor and member whereby the rotor and member will be moved in unison.

3. In apparatus for applying coating material to the inner peripheral surface of a flange member, an applicator unit having a chamber for containing a quantity of liquid adhesive with the height of said chamber less that the diameter of said flange member, an applicator comprising

a circular rotor journaled on said unit and having a frusto-conical peripheral portion engaged in the adhesive in said chamber so as to institute circuitous flow of said adhesive toward and from said rotor and to dispense adhesive from said chamber when the rotor is rotated, means for rotating said rotor about a substantially horizontal axis, means on said unit cooperative with the rotor for forming on the latter adjacent peripheral zones of adhesive of relatively different radial thickness, a gauging plate carried by said unit and engageable by said member so as to position said surface of the member in prescribed relation to said rotor and said peripheray zones thereof, said plate being angularly disposed relative to a vertical and horizontal plane, and said surface of the member being engageable with the adhesive on one of the peripheral zones of the rotor for establishing tractional engagement and unitary movement between said rotor and said member.

4. In apparatus for applying coating material to the inner peripheral surface of a flange member, an applicator unit having a chamber for containing a quantity of liquid adhesive, an applicator comprising a substantially circular rotor journaled on a generally horizontal shaft in said chamber, said rotor being engaged in a portion thereof with the liquid adhesive in said chamber so as to initially institute circuitous flow of adhesive in said chamber and to carry adhesive out of said chamber as the rotor is rotated, said rotor having a frusto-conical peripheral surface, a cover plate on said applicator unit having an edge portion contoured and disposed closely adjacent the periphery of said rotor for intercepting quantities of adhesive carried upwardly from the chamber in said circuitous flow and for returning said intercepted quantities to the chamber, said cover plate in a portion thereof being provided with a notch overlying the peripheral zone of the rotor of lesser diameter for shaping a radially thickened bead of adhesive on said latter peripheral zone and in another portion thereof being arranged to deposit a thin film of comparatively tacky adhesive on a peripheral zone of the rotor adjacent that on which said bead is formed, a gauging plate carried by said unit and engageable by a member so as to position said surface of the member in prescribed relation to said rotor and said bead of adhesive carried thereby, said gauging plate lying in a plane substantially at right angles to the axis of said rotary periphery in the portion thereof remote from said chamber, and said surface of the member being engageable with the tacky adhesive on said zone of larger diameter of the rotor for establishing tractional engagement and unitary movement between said rotor and said member.

5. In apparatus for applying coating material to the inner peripheral surface of a flange member, an applicator unit having a chamber for containing a quantity of liquid adhesive, means for introducing adhesive into said chamber, an applicator comprising a circular rotor journaled on a substantially horizontal shaft in said chamber and disposed intermediate the ends of said chamber and having adjacent peripheral areas one of which is of slightly lesser diameter than the other peripheral area, said peripheral areas of the rotor being engaged in a portion thereof in the liquid adhesive in said chamber so as to institute circuitous flow of adhesive and to carry adhesive out of said chamber as the rotor is rotated, an angularly arranged deflector on said applicator unit in said chamber and operatively associated with said rotor for intercepting adhesive in said flow thereof and for directing adhesive toward an end of the chamber, a cover plate on said applicator unit having an edge portion contoured and disposed closely adjacent the periphery of said rotor for intercepting quantities of adhesive carried in said flow upwardly from the chamber and for returning said intercepted quantities to the chamber, said cover plate in a portion thereof being provided with a notch overlying the peripheral zone of the rotor of lesser diameter for shaping a radially thickened bead of adhesive on said latter peripheral zone, and in another portion thereof depositing a film of adhesive of a tacky consistency on an adjacent peripheral zone of the rotor, a gauging plate forming an end of said chamber and engageable by a member so as to position said surface of the member in prescribed relation to said rotor and said bead of adhesive carried thereby, and said surface of the member being engageable with the tacky adhesive on said adjacent zone of the rotor for establishing tractional engagement and unitary movement between said rotor and said member.

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