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[54] **APPARATUS FOR COATING FOILS OR BANDS ON ONE SIDE WITH SOLUTIONS OF HIGH VISCOSITY**

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[58] Field of Search.....118/400, 404, 419, 423

[56]

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[57]

ABSTRACT

In an apparatus for coating foils or bands on one side with solutions of high viscosity as the foils or bands are passed through a gap, the surface of one wall of which is wetted with the solution of the gap is formed by a rotatably mounted support roller for the band which is to be coated and the other wall surface is formed by a cup which is adapted to the circumference of the roller and which is suspended via a weight loaded lever system in such a manner that it is three-dimensionally displaceable on it.

9 Claims, 4 Drawing Figures

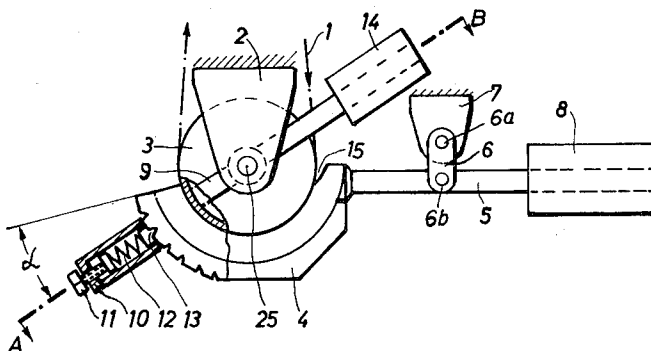


FIG. 1

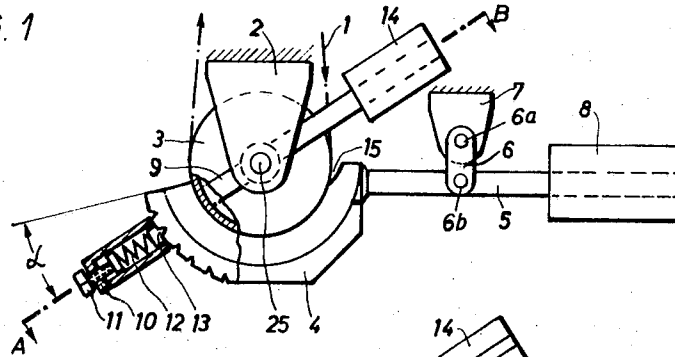


FIG. 2

A-B

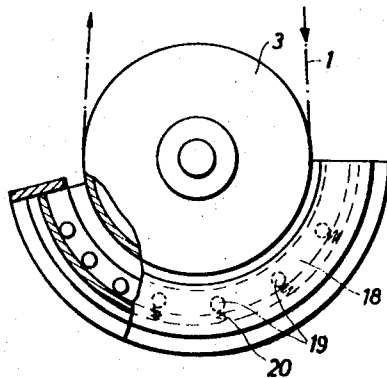
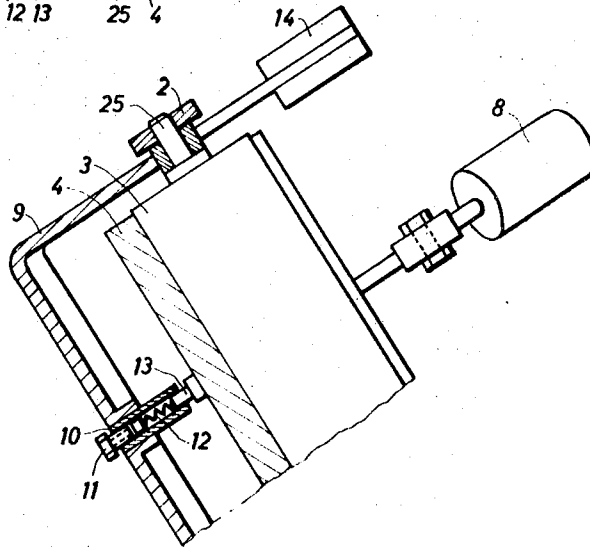


FIG. 3

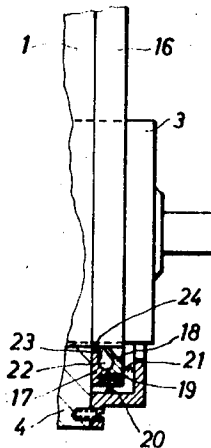


FIG. 4

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APPARATUS FOR COATING FOILS OR BANDS ON ONE SIDE WITH SOLUTIONS OF HIGH VISCOSITY

The invention relates to an apparatus for coating foils or bands on one side with solutions of high viscosity as the foils or bands pass through a gap which is wetted with the solution on the surface of one wall, use being made of the so-called wedge spreading effect.

Known apparatuses of this type consist of parts which are stationary when in operation, e.g. two fixed plates which are arranged at some distance apart so as to form a gap. The band is passed through the gap, which is filled with a liquid. This apparatus is satisfactory for the formation of a uniform layer, e.g. of liquids of high viscosity, but the thickness of the layer cannot be varied or adjusted as desired. Moreover, it has not hitherto been possible to obtain a precisely defined uncoated edge to the foil.

According to the invention, these requirements are met by providing one surface of the gap in the form of a rotatably mounted support roller for the band which is to be coated, and the other surface of the gap in the form of a cup which is adapted to the circumference of the roller and which is suspended via a weight loaded lever system in such a manner that it is three-dimensionally displaceable on it; a stirrup, which can be adjusted by a pivotal movement, is arranged round the bearing pins of the roller, and thrust means are arranged between this stirrup and the cup. For any given geometrical dimensions of the roller, cup and foil, the quantity of coating material transported through the cup by the foil which is to be coated can be easily varied by adjusting the thrust means.

In order to obtain a neat uncoated foil edge, sliding sealing means which are pressed radially against the roller by springs and are pressed against the end face of the cup in a direction parallel to the axis of the roller by other springs, are provided according to the invention near the edge of the foil.

In order to prevent the coating material from escaping through the gap between the inner edge of the sealing means and the foil, a channel which is fed with compressed air and has an exhaust slot directed towards the gap is provided in the sealing means.

An embodiment of the coating apparatus is shown diagrammatically by way of example in the drawing.

FIG. 1 shows a coating apparatus in side view.

FIG. 2 shows this coating apparatus in section A-B of FIG. 1.

FIGS. 3 and 4 show a device for confining the layer in the lateral direction.

In FIG. 1, the foil 1 which is to be coated is passed in the direction indicated by arrows over a roller 3 which is rotatably mounted in bearing plates 2. A cup 4 is suspended in a bearing 7 including pivots 6a and 6b by means of the lever 5 and an intermediate lever 6.

The moments of weight about the pivot of the lever 5 are balanced by a counterweight 8. The internal radius of the cup 4 is slightly greater than the radius of the roller 3 plus the thickness of the foil. The cup 4 is, therefore, horizontally and vertically displaceable by movement of pivots 6a and 6b within the clearance between the cup 4 and the foil 1. A stirrup 9 is rotatably mounted on the bearing pins 25 of the roller 3. This stirrup carries one or more thrust transmission means which consist of a guide 10, an adjustment screw 11, a spring 12 and a thrust pin 13. The moments of weight of the stirrup 9 and these means with reference to the shaft of the roller 3 are balanced by the counterweights 14.

When the coating apparatus is in operation, the coating material is fed continuously into the pocket 15 of the cup 4 and is pulled by the movement of the foil into the wedge-shaped gap formed by the difference in the radius of the cup and the radius of the surface of the foil. A coating film is formed in a friction bearing between the foil 1 and the cup 4. The force which acts radially via the thrust transmission means 10, 11, 12 and 13 and which can be adjusted by means of the adjustment screw 11 and spring 12 corresponds to the bearing load. The relationship between the size and direction

of the thrust and the form of gap established under this force is determined by the known relationships of the theory of friction (journal) bearing lubrication. The form of the gap is defined by the external radius of the roller, the internal radius of the cup and the thickness of the foil and by the position and magnitude of the smallest cross-section of the throughflow in response to rotation of the roller. It determines the quantity and thickness of coating material transported through the cup. This can easily be varied for any given geometrical dimensions of roller, cup and foil by varying the amount of thrust by operating the adjustment screw 11 and spring 12. Furthermore, it has been found that the quality of the coating can be altered by varying the direction of the force, i.e. by pivoting the stirrup 9 about the roller shaft.

A precisely defined uncoated foil edge 16 (FIG. 4) is produced by an additional device, the sealing means of which is composed of the two parts 17 and 18 and the screws 19. This means is pressed radially against the roller 3 by springs 20 and against the end face of the cup 4 in a direction parallel to the roller shaft by springs 21. If the sealing surfaces of the means and the end surface of the cup 4 are manufactured with sufficient precision, the coating material can, in this way, be prevented from flowing out of the cup in a lateral direction.

If contact between the sealing means and the foil, which is essential with this method of sealing, is undesirable, other known sealing means may be employed.

If the pressures are so high and the viscosity of the coating material so low that the tension provided by the sealing element is not sufficient, a channel 22 and slot 23 may be provided in this sealing means. The channel 22 is charged with, for example, compressed air. The pressure head produced by the air flowing out of the slot 23 then blocks the gap 24 between the sealing means and the foil so as to prevent the escape of the coating material.

We claim:

1. A coating device for applying a coating of a viscous fluid to an elongated foil comprising a cylindrical roller about which said foil is partially wrapped and having an axis of rotation, bearing means mounting said roller for rotation about said axis in response to traversal of said foil around said axis, a cylindrical cup having a radius slightly greater than that of said roller disposed adjacent said roller whereby a gap is formed therebetween, said viscous fluid being disposed in said gap, and movable support means mounting said cup for horizontal and vertical movement relative to the axis of said roller whereby the dynamic forces generated in said viscous fluid by rotation of said foil and said roller through said viscous fluid in said gap make said gap wedge-shaped and precisely controls the amount and thickness of coating applied to said foil.

2. A coating device as set forth in claim 1 wherein said movable support means comprises a counter-balanced lever connected to said cup, a base and a double pivoted link rotatably connecting said counter-balanced lever to said base whereby said cup is free to move horizontally and vertically relative to said axis.

3. A coating device as set forth in claim 1 wherein adjustable force transmitting means is disposed between said movable support means and said cup for varying the radial forces acting in said viscous fluid contained in said gap.

4. A coating device as set forth in claim 3 wherein said adjustable means is elastic whereby the size of said wedge-shaped gap is resiliently controlled.

5. A coating device as set forth in claim 4 wherein said elastic means comprises a spring, the tension of which is adjustable.

6. A coating device as set forth in claim 3 wherein said adjustable force transmitting means comprises a stirrup bracket having an outer bar disposed parallel to the axis of said roller and cup, said bracket also have a pair of arms connected to the ends of said bar and substantially perpendicularly disposed to said axis of said roller and rotatable coupling means on the ends of said arms connecting the ends of said arms to the axis of said roller.

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7. A coating device as set forth in claim 6 wherein said adjustable force transmitting means is mounted on said elongated bar adjacent the outside of said cup and reacting therebetween and is resilient.

8. A coating device as set forth in claim 6 wherein said cup includes a slit between said foil and said sealing means and comprising a slot in said cup through which a high pressure air stream is discharged against said slit so as to prevent the

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escape of coating liquid from said cup.

9. A coating device as set forth in claim 1 wherein said cup has faces at its ends and comprising in addition, sealing means near the edge of the foil, the sealing means being pressed by springs radially against the roller and laterally against the end faces of the cup.

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