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MANUFACTURE OF FILMS AND FOIL

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Fig. 1.

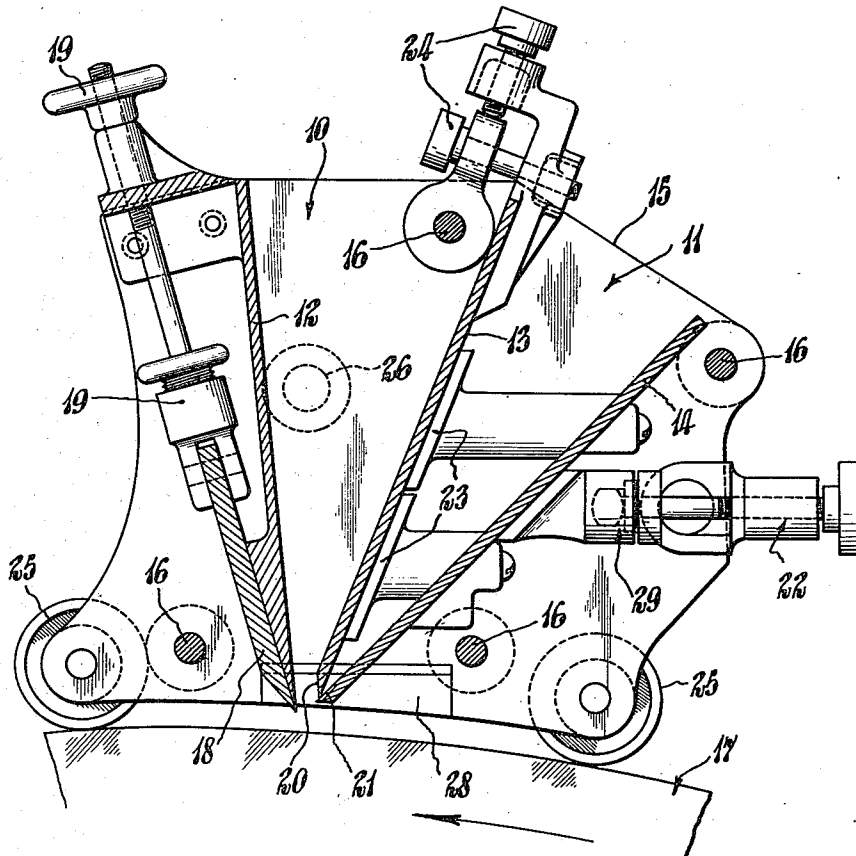
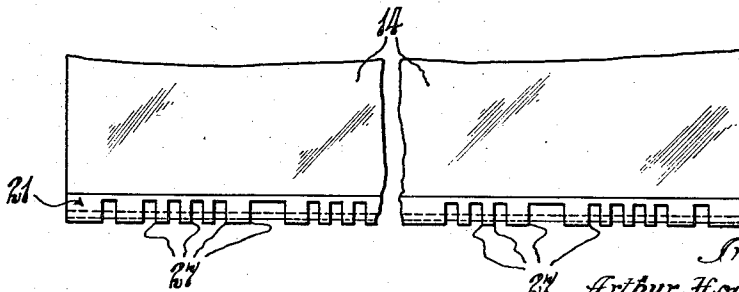


Fig. 2.



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MANUFACTURE OF FILMS AND FOIL

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15 Claims. (Cl. 18—15)

The invention relates to the production of bands, films and foils by means of a pouring or casting process and has particular significance for the production of transparent or translucent films or foils from cellulose acetate or similar materials.

In this method the material is taken in liquid condition from a pouring vessel provided with a slot and applied to a rotary drum or an endless continuous band or other suitable conveyor means in order that it can be stripped off in the form of a lamellar structure after the evaporation or removal of the solvent. Generally this structure has hitherto been produced either uncoloured or coloured as a whole. There has been no lack of attempts to obtain patterned materials but these attempts have not been accompanied by success. If, for example, as has been suggested the pouring vessel is sub-divided longitudinally by means of a partition which terminates somewhat above the slot and each of the two halves of the pouring vessel formed by this partition is furnished with outlet apertures in accordance with the pattern, the desired sharply defined patterning does not occur and above all there is the disadvantage that such pouring vessels very quickly become blocked and only reproduce the pattern defectively or else do not operate at all. Similar circumstances arise also with pouring vessels which are furnished with transverse walls up to the slot and are filled with solutions of various colours. Here it is found that with small stripes the outlet aperture rapidly clogs due to drying of the solution and the pattern becomes defective or is suspended.

Accordingly the idea of obtaining patterns merely by using correspondingly constructed pouring vessels has been abandoned. The invention resides in the first place in a new method for the production of patterned materials in which the disadvantages referred to above are avoided and products which are satisfactory in every respect are obtained. In accordance with the invention a solution passes from the slot of a pouring vessel and in its emergence carries along with it from one or more auxiliary pouring vessels, the slot or slots of which are provided with sub-divisions in accordance with the pattern, stripes of a solution which is differently composed or differently coloured. Thus this emerging solution exerts a tractional action on the more or less narrow stripes of the further solution or solutions provided for the patterning and emerging from the auxiliary pouring vessel or vessels, which action prevents the more

or less narrow apertures for the patterning solutions from becoming blocked. It is clearly shown that such a tractional action arises when the ordinary pouring vessel becomes empty; in this case no solution emerges from the patterning pourer or pourers. At the same time a further surprising and wholly novel effect arises. The material emerging from the ordinary pouring vessel is completely replaced or as it were displaced by the stripes emerging from the patterning pouring vessels. In this way it is possible to produce stripes even in a coloured basic mass which emerges from the ordinary pouring vessel by means of uncoloured or differently coloured patterning solutions, the stripes being sharply defined from the colour of the basic material and not covered thereby.

The solutions employed in the method can be of various colours. In this way variously coloured stripes are obtained by employing differently coloured solutions. Moreover, by means of these solutions certain crepe or ribbed effects can be obtained if for example a definite amount of shrinkage occurs when the materials harden. Also the thickness of the patterned structure can in this way be influenced in accordance with the pattern.

The invention also relates to an arrangement for carrying out the process which arrangement is furnished in addition to the ordinary pouring vessel with one or more auxiliary pouring vessels which have a front plate and a rear plate or matrix. The latter projects somewhat beyond the lower edge of the front plate and is provided with apertures at its lower edge in accordance with the pattern.

For this purpose essential parts of this arrangement are adjustable. The auxiliary pouring vessel or vessels which hereinafter will be referred to as patterning pourers are adjustable in respect of their angle of inclination. For this purpose they are pivotally mounted and are furnished with an adjusting screw. Also the adjustment of the front wall of the patterning pourer or pourers can be effected with respect to the apertured rear wall by means of an adjusting screw in order in this way to regulate the quantity of solution passing through the apertures. In this way the quantity of the solution emerging in accordance with the pattern can be readily and very precisely adjusted. It is therefore advisable to arrange the device in such manner that the pourers deliver the liquid mass at a point which lies a little in front of the

highest point of the feed drum or feed band in the direction of rotation.

The invention will be explained with reference to the accompanying drawing in which

- 5 Fig. 1 shows a vertical section, and
Fig. 2 a fragmentary view.

For the sake of simplicity it is assumed in Fig. 1 that the arrangement operates only with two pouring vessels but it is directly possible to operate with a larger number. Each of the two pouring vessels is filled with one or more solutions which are either uncoloured or are coloured with a definite colour. The colour of the solutions in the patterning pourer is preferably different from the colour in the ordinary pourer. The arrangement shown in the example comprises two pourers 10 and 11 which are formed from the plates 12, 13 and 14 and are closed at the side by side plates 15. The entire structure is held rigidly connected by means of stay-bolts 16. The plate 13 constitutes the rear wall of the ordinary pouring vessel 10 and at the same time the front wall of the patterning pourer 11.

The lower edge of the plate 12, which is preferably in the immediate vicinity of the highest point of the drum or the feed band 17, has at its end a doctor or stripper knife 18 which rests on one side of the plate 12 and is adjustable by means of an adjusting screw 19 in its separation from the conveyor device 17. The plate 13 which as already mentioned constitutes the rear wall of the ordinary pourer 10 and the front wall of the patterning pourer 11 and accordingly spaces the two pourers one from the other has an appropriately constructed lower edge 20 which abuts against the plate 14 and the matrix 21. The latter plate has at its lower edge recesses or apertures in accordance with the pattern or is furnished with a correspondingly constructed matrix 21 which is carried by the plate 14. Details of the lower edge of the patterning plate 14 and matrix 21 are shown in Fig. 2. Slots or apertures 27 are provided in accordance with the desired patterning. Moreover the matrix may be adjustable in respect of height on the plate itself. Also the plate 13 is adjustable with respect to the plate 14 and this matrix 21. For this purpose adjusting screws 24 are provided. In this way it can be arranged that the rear plate 14 and matrix 21 project to a greater or less extent beyond the lower edge 20 of the plate 13.

The patterning pourer 11 with its plates 13 and 14 is pivotally mounted on one of the stay-bolts 16. The adjustment of the angle of inclination of the plate 14 is effected by means of an adjusting device which comprises an adjusting screw 22 and a ball joint 29. The plate 14 also carries abutments 23 which abut against the plate 13. The lateral walls of the pourers 10 and 11 are constituted by adjustable side plates 28. The entire device is carried on the drum or the feed band 17 by means of ball-bearing rollers 25 which are provided on the side plates 15 and is adjustably mounted on the machine by means of the bosses or shoulders 26 which project outwardly from each of the plates 15.

The mode of operation of the device is as follows. The pouring vessel 10 is for example filled with the basic mass for the film which may be either coloured or uncoloured. The solution passes through the outlet aperture formed by the plates 12 and 13 to the drum or conveyor band 17, the thickness of the lamellar structure being adjustable by means of the doctor 18.

75 The pourer 11 contains one or more materials

which normally are of a different colour from the basic material in the pourer 10. These materials pass from the patterning apertures 27 in the matrix 21 or in the lower edge of the rear plate 14 and pass into the basic material which emerges from the pourer 10. In this way on the one hand a continuous emergence of the patterning solution from the pourer 11 is ensured and a blockage of the apertures is prevented whereas on the other hand this solution passes in accordance with the pattern into the solution emerging from the first container and completely displaces it. The product patterned in this manner consequently sets as a complete unit after the removal of the solvent without the pattern being in any way inaccurate. The result of the patterning can moreover be regulated by adjusting the plate 13 or the inclination of the plate 14. In consequence of the motion of the conveyor device 17 and in view of the adjustment of the pouring vessels 10 and 11 a certain rolling action is exerted on the solutions. Naturally the distance between the outlet point and the surface of the drum or conveyor band 17 is adjusted in such manner that no or at least no material diffusion or running effect can arise. Accordingly the desired pattern is substantially sharp.

I claim:

1. The method of producing a patterned article from cellulose derivative, such as cellulose acetate, which consists in pouring one cellulose solution on to a casting surface from an uninterrupted pourer and supplying a second solution to an interrupted pourer, the pourers being placed at such relative points that the solution from the first pourer draws out and is partially displaced by the solution from the second.

2. The method of producing a patterned article from cellulose derivative, such as cellulose acetate, which consists in pouring one cellulose solution on to a revolving casting drum from an uninterrupted pourer and supplying to said solution a second solution from an interrupted pourer, the pourers being so arranged that the solution emerging from the first pourer is partially displaced by the solution from the second.

3. Apparatus for the production of a patterned article from cellulose derivative, such as cellulose acetate, comprising a travelling casting surface, a first pouring vessel arranged to deliver an uninterrupted solution on to said surface, and a second pouring vessel arranged to deliver an interrupted solution into the emerging first solution, said second vessel having its outlet at such a point that the second solution is pulled out by the emerging first solution and partially replaces the same to form the desired pattern.

4. Apparatus for the production of a patterned article from cellulose derivative, such as cellulose acetate, consisting of a travelling casting surface, and a pair of pouring vessels, comprising three plates, the middle one dividing the two vessels and the rear plate having a patterned edge projecting beyond the lower edge of the middle plate.

5. Apparatus for the production of a patterned article from cellulose derivative, such as cellulose acetate, consisting of a revolving casting drum, a main pouring vessel and an auxiliary pouring vessel, said vessels comprising three plates the middle one of which divides the two vessels and terminates short of an apertured edge of the rear plate.

6. Apparatus according to claim 5 in which the pouring vessels are arranged immediately before the highest point of the drum.

7. Apparatus for the production of a patterned article from cellulose derivative, such as cellulose acetate, consisting of a rotary casting drum and a pair of pouring vessels co-operating therewith, such vessels being positioned so that the second delivers an interrupted solution into and in partial replacement of a continuous solution emerging from the first to form the desired pattern.

8. Apparatus for the production of a patterned article from cellulose derivative, such as cellulose acetate, consisting of a travelling casting surface, a first pouring vessel, and a second pouring vessel having an apertured rear wall projecting beyond the rear wall of the first vessel.

9. Apparatus according to claim 8 wherein the rear wall of the second vessel is provided with adjusting mechanism whereby its inclination may be varied.

10. An apparatus for producing a patterned article from a cellulose derivative, such as cellulose acetate, comprising a rotary drum having a casting surface thereon, a pouring device carried on said drum by means of rollers and adjustably mounted on the apparatus, said pouring device comprising two pouring vessels formed by two side plates, and a front, intermediate and rear plate, an adjustable stripper knife arranged in front of the front plate, an adjusting device for varying the angle of inclination of the rear plate, abutments on the rear plate which abut against the intermediate plate, a matrix on the rear plate, and means for adjusting the intermediate plate with respect to the rear plate and said matrix.

11. A method of producing patterned articles from a cellulose derivative, such as cellulose acetate, comprising pouring a continuous sheet of cellulose solution on a relatively moving casting surface and causing said continuous sheet to draw an interrupted sheet of a different solution through a matrix for forming the desired pattern, whereby the corresponding portions of the continuous sheet are displaced or completely replaced by the interrupted sheet in accordance with the desired pattern.

12. A method for producing a patterned article from a cellulose derivative, comprising flowing one cellulose solution in a continuous stream on to a

surface, supplying a second solution adjacent said first solution and causing the first solution to draw into itself as it is flowed onto said surface the second solution in a patterned stream, whereby the second solution partially displaces the first solution to produce an article having the desired sharply defined patterning.

13. An apparatus for producing a patterned article from a cellulose derivative, comprising a plurality of pouring vessels filled with different solutions, a continuous casting surface, said vessels and surface being movable relative to each other, one pouring vessel being adapted to flow a continuous stream of solution on to said surface, and the remaining pouring vessels being adapted to have withdrawn therefrom by said continuous stream at least one interrupted stream of patterning solution, whereby the desired sharply defined pattern is formed by the continuous emergence of at least one patterning solution passing in accordance with the desired pattern into the continuous stream of solution to completely displace it.

14. An apparatus for producing a patterned article from a cellulose derivative, comprising means for producing an uninterrupted sheet of cellulose solution and means for producing an interrupted sheet of solution, said first mentioned means causing the uninterrupted sheet to exert a tractional action on said interrupted sheet whereby blocking of the second mentioned means is avoided.

15. An apparatus for producing a patterned article from a cellulose derivative, comprising means for forming a continuous sheet of cellulose solution, means for conveying said sheet away from said forming means, means for varying the thickness of said sheet, means for forming an interrupted sheet of solution and means for adjusting said last mentioned forming means, said first mentioned forming means being positioned so that the continuous sheet contacts the interrupted sheet of said second mentioned forming means, whereby the interrupted sheet is withdrawn and passes into the continuous sheet to form the desired pattern.

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