

PROCESS AND DEVICE FOR CUTTING STRIPS FROM A MASS
MATERIAL, PARTICULARLY A RUBBER

This invention relates to a process and device for use therein which enables strips to be cut from a mass of material. In particular, the invention relates to a process capable of producing strips
5 which may have a small thickness in relation to their other dimensions.

The invention will be described with particular reference to the mass of material being a rubber, more particularly a rubber obtained by
10 coagulation from a latex, such a material commonly being referred to as "coagulum". However, it should be noted that the invention may be applied to other materials, for example plastics materials, food products, wood, mineral materials, metals.

15 Known processes which are used in natural rubber plantations consist of coagulating the latex in elongated, shallow troughs. In this way, strips of latex coagulum are directly obtained at a thickness of approximately 10 to 15 cm. These strips are then
20 subjected to known treatments, for example crushing or

granulation followed by drying. This method of obtaining strips has the following disadvantages:

given the shallowness of the troughs, the coagulation installations require very large surfaces, which poses problems of implantation and requires very high investment;

on coagulation, the ratio of surface/volume of the coagulum is great, and its surface area which is in contact with the air is large, which causes a very notable superficial oxidation of the coagulum, resulting in damage to the material and a variation which is detrimental to quality.

To try to eliminate these disadvantages, attempts have been made to obtain thick blocks on coagulation, and to then cut these blocks into strips. Practical experience has shown that this cutting operation poses great difficulties which are particularly associated with the flexibility, the lack of rigidity and the poor resistance to traction of the coagulum. The handling devices used in the cutting operation may result in crushing or breaking of the coagulum, which poses complex manufacturing problems and causes considerable variations in the quality of the product.

The invention has been made with the above points in mind.

Therefore according to the invention there is provided a process for obtaining strips from a mass of material, in which the mass of material is floated in a fluid and that portion of the material projecting above the fluid is subjected to a cutting operation to form strips.

Also according to the invention there is provided a device for cutting strips from a mass of material, which comprises means to float the mass of material in a fluid and means for cutting strips of material from the part of the material projecting above the fluid.

The invention will now be described with reference to the accompanying drawings, in which:

Figure 1 represents a vertical section through a device according to the invention, the plane of the section being represented by the line I-I in Figure 2;

Figure 2 represents a plan view of the device shown in Figure 1, and

Figure 3 represents a side view of a further device according to the invention.

Figures 1 and 2 represents a device 1 according to the invention. The device 1 comprises a trough 2 of elongated shape which is horizontal along its longitudinal axis. A material 3, which
5 is intended to be cut up into strips is positioned in the trough 2. This material 3 may be, for example, a block of natural rubber formed previously within the trough 2 by coagulation from a latex introduced into the trough.

10 The known means for forming the latex coagulum in the trough comprise, in this example, a conduit 20 for latex 21, opening at an extremity of the trough 2 and a conduit 22 for coagulating agent 23. The coagulating agent may be any known
15 agent, in particular formic acid, acetic acid or a biological agent. The conduit 22 of coagulating agent opens into the conduit 20 of latex (Figure 2) in order to attain a homogenous product. It will be readily appreciated that any other method may be used
20 to obtain the block 3 of coagulum.

The device 1 comprises a conduit 4 allowing a fluid 5, preferably a liquid, for example, water, to be introduced into the trough 2 and the flow of fluid being controlled by the shutter 6 (Figure 1). The
25 fluid 5 is introduced into the trough 2 such that the

fluid 5 is directly in contact with the material 3 which thus floats in the fluid and comprises a part 7 which is situated above the fluid. The coagulum 3 floats in the fluid, given that in practice its
5 density varies between 0.6 and 0.9.

The device 1 comprises cutting means 8 which are capable of cutting strips from the projecting part 7. These means comprise a saw 9 with a band 10 wound around two fly-wheels 11,12, the band 10
10 preferably being without teeth. The fly-wheel 12 is driven by the motor 13. The assembly of fly-wheels 11,12 and motor 13 is fixed on a chassis 14 which in turn is mounted on four wheels 15 which roll on two horizontal rails 16 arranged along the upper part of
15 the trough 2 and on either side of this trough. The chassis 14 and the wheels 15 constitute a carriage 17 which is mobile horizontally above the trough 2 and over the entire length of the trough 2. The lower part 10A of the band 10 has a horizontal orientation
20 and it allows a strip 18 to be cut from the projecting part 7, owing to the movement of the carriage 17. When the strip 18 is cut, it is moved laterally by known means, which are not shown in the drawing in the interests of clarity, these means being, for example,
25 a conveyor belt or a floating trough. A new quantity of

fluid is then introduced into the trough 2 so that the projecting part 7 reaches the same level as previously, and a new strip 18 is cut. The thickness "e" of the strips is determined by the quantity of fluid introduced into the trough 2 before each cutting operation. The thickness "e" may also be regulated by variation of the density of the fluid 5, for example by using a fluid which is heavier than pure water and compatible with the material 3, particularly by using a supply of saline water (not shown in the drawing). The thickness "e" may also be regulated by varying the height of the lower part 10A of the band 10 by known means and which are not represented in the drawing, this variation of height being obtained, for example by vertically displacing the fly-wheels 11,12. The last strip can be constituted, for example, by the remainder of the block 3 in the trough 2 at the end of the cutting operation. The lateral opposing walls 19 of the trough 2, arranged parallel to the rails 16 preferably diverge from each other towards the top, thus forming an angle α so as to facilitate the upward movements of the block 3. This angle α preferably has a value such that the walls 19 retain their role as guide during all the successive cutting operations. The angle α which these walls 19 form may vary, for

example, from 2 to 10°, and preferably from 2 to 5°. The distance between the walls 19 and the material 3 has been exaggerated in Figure 1 to clarify the drawing. The advantages obtained using the device 1 include:

- a) the cutting operation is performed without handling of the material, thereby no crushing of this material results, despite the flexible and not very resistant structure of the coagulum. It is possible to carry out the cutting of the strips on thick blocks obtained by coagulation of the latex in troughs 2 which may be practically of any depth. For example, cutting of strips has been carried out on blocks of approximately 25 m long, 60 cm wide and 1 m thick, having a total weight to approximately 15 tonnes; these blocks being obtained in troughs 2 having essentially the same dimensions as the blocks. The thickness of the blocks corresponds essentially to the depth of the corresponding troughs. In the case where the walls 19 of a trough form between them an angle α which is not zero, the width of the trough is determined at the level of its median depth. By way of example, the known techniques for directly obtaining strips by coagulation produce blocks of approximately 1.5 tonnes. The invention therefore

allows the surface area necessary for the latex coagulation installations to be reduced to approximately one tenth, allowing considerably reduced investments and working costs. The preceding figures concerning the execution of the invention are given only by way of example; in fact, one can envisage troughs having a depth distinctly greater than 1 m, and any length which can be very much greater than 25 m. The blocks can be of any width, because the width is limited only by the structure of the cutting means,

b) the invention allows thick blocks to be treated, i.e. blocks in which the ratio of surface/volume is low. In this way the superficial oxidation of air of the coagulum is considerably limited. This advantage together with the substantially total absence of crushing during cutting results in a rubber with both a uniform and satisfactory quality,

c) the invention allows the thickness "e" of the strips 18 to be easily varied as required, this being within broad limits, the thickness "e" most commonly used at present varying, for example, from 10 to 20 cm.

Figure 3 represents another device according to the invention. This device comprises a runner 31, mounted at the rear of the carriage 17,

i.e. at the extremity of this carriage opposite the flywheels 11,12. This runner 31 is connected to the carriage 17 by means which allow the height of the runner 31 to be regulated, these means being in this example an axle 32 which is mobile vertically. The vertical movements of the runner 31 are shown diagrammatically by the arrows F_3, F'_3 . The device 30 operates in the following manner. The carriage 17 is positioned at one extremity of a trough 2, the runner 31 is lowered such that it comes to apply itself onto a rail 33, for example perpendicular to rails 16, the axle 32 of the runner 31 being therefore parallel to the rails 16. Then the extremity of the carriage 17 is lifted, where the flywheels 11,12 are situated, this movement being shown diagrammatically by the arrow F''_3 . The lifting may be conducted manually, or with mechanical means (not shown in the drawing), for example a roller bridge. It is therefore, easy to move the carriage 17 by rotation of the runner 31 on the rail 33 so as to arrange the carriage 17, for example, above another trough 2, so as to carry out a new strip-cutting operation.

The invention is not restricted to the exemplary embodiments described above. It will readily be appreciated that means other than saws can be used to cut the strips, for example wires, which may be heated.



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CLAIMS:

1. A process for obtaining strips from a mass of material, in which the mass of material is floated in a fluid and that portion of the material projecting above the fluid is subjected to a cutting operation
5 to form strips.
2. A process as claimed in Claim 1, in which the thickness of the strips is regulated by the quantity of the fluid in contact with the material.
3. A process as claimed in Claim 1 or Claim 2,
10 in which the thickness of the strips is regulated by the density of the fluid.
4. A process as claimed in any preceding claim, in which the thickness of the strips is regulated by the height at which the cutting operation is performed.
- 15 5. A process as claimed in any preceding claim, in which the fluid is a liquid.
6. A process as claimed in any preceding claim, in which the mass of material is latex coagulum.
7. A process as claimed in Claim 6, in which
20 a latex is introduced into a trough, which is coagulated so as to obtain a block of coagulum, and thereafter said fluid is introduced into this same trough to allow the block to be floated in the fluid in this trough and thereafter the part of the block
25 projecting above the fluid is subjected to a cutting operation to form the strips.

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8. A process as claimed in Claim 6 or Claim 7, in which the latex is a natural rubber latex.

9. A process as claimed in Claim 1 substantially as herein described with reference to Figures 1 and 2 or Figure 3 of the accompanying drawings.

10. A device for cutting strips from a mass of material, which comprises means to float the mass of material in a fluid and means for cutting strips of material from the part of the material projecting above the fluid.

11. A device as claimed in Claim 10, in which the means to float the material comprise a trough.

12. A device as claimed in Claim 11, in which lateral opposing walls of the trough diverge from one another towards the top.

13. A device as claimed in Claim 12, in which the angle formed between the lateral walls is from 2 to 10°.

14. A device as claimed in Claim 13, in which the angle is from 2 to 5°.

15. A device as claimed in any one of Claims 10 to 14, in which the cutting means comprises a band-saw.

16. A device as claimed in Claim 15, in which the band of the saw is without teeth.



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17. A device as claimed in any one of Claims 10 to 16, in which the cutting means additionally comprises a carriage and means for moving the carriage along the length of the material.

5 18. A device as claimed in Claim 17, in which the cutting means comprises a band-saw mounted on the carriage.

19. A device as claimed in Claim 17 or Claim 18, which additionally comprises means for moving the carriage in a direction other than along the material.

10 20. A device as claimed in Claim 19, in which the means allowing the carriage to be moved in a direction other than along the material comprises a runner connected to one extremity of the carriage and means allowing the height of this runner to be altered.

21. A device as claimed in any one of Claims 10 to 20, which comprises means allowing the quantity of fluid brought into contact with the material to be varied.

20 22. A device as claimed in any one of Claims 10 to 21, which comprises means allowing the density of the fluid to be regulated.

23. A device as claimed in any one of Claims 10 to 22, which comprises means allowing the height of the cutting means to be regulated.

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24. A device as claimed in any one of Claims 10 to 23, in which the fluid is a liquid.

25. A device as claimed in any one of Claims 10 to 24 adapted for cutting strips of latex coagulum.

5 26. A device as claimed in Claim 25, which comprises a trough, means allowing a latex to be introduced into this trough, means allowing the latex to be coagulated so as to obtain a block of coagulum means to float this block in the fluid in the trough, 10 and means for cutting the strips from the part of the block projecting above the fluid.

27. A device as claimed in Claim 25 or Claim 26, in which the latex is a natural rubber latex.