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DEVICE FOR CUTTING OF HIGH-POLYMER SHEET FORMED IN A ROLLER MILL

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FIG. 1

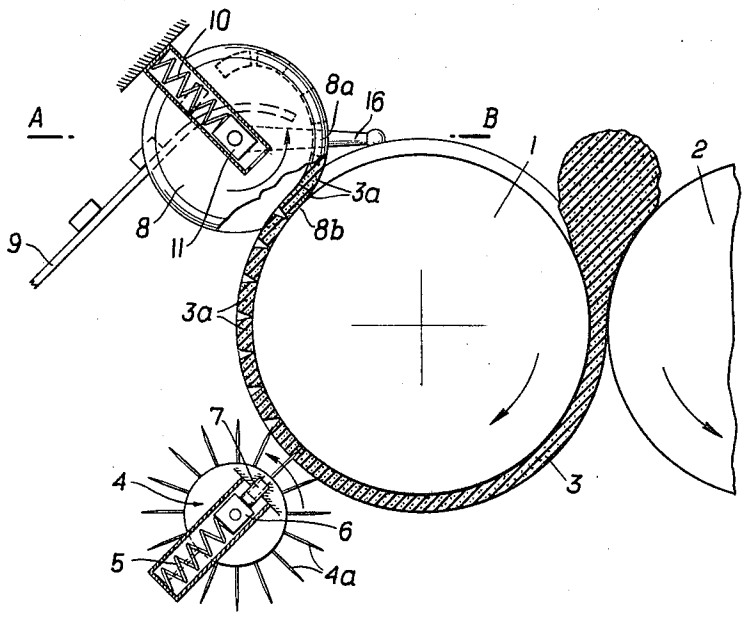
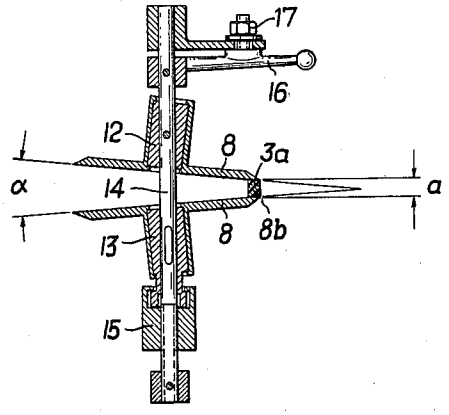


FIG. 2



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DEVICE FOR CUTTING OF HIGH-POLYMER SHEET FORMED IN A ROLLER MILL

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U.S. Cl. 83—302 7 Claims

ABSTRACT OF THE DISCLOSURE

A device for cutting high-polymer sheet which had formed in a roller mill. The device consists of two rotary cutting discs offset at an angle relative to each other, the shortest distance between the discs being closest to the sheet-carrying roller above which these discs are disposed. When the sheet is to be cut into plates, a transverse wheel and knife assembly is attached so that it cuts prior to the cutting action of the discs. The angle of the latter relative to the sheet-carrying roller ranges from 2 to 60°, depending on whether very hard or very soft sheet is to be cut.

The invention relates to an improved device for cutting of ribbons and plates from high-polymer sheets formed on a roller mill and consisting of rubber, plastics, and similar materials, by means of rotary knives.

It is known how to cut a sheet formed on roller mills on the surface of one of the rollers with two parallel cutting discs or rotary knives, to remove the sheet manually from the roller and to transport it by conveyor means to further fabrication devices. In this method, the sheet material frequently sticks to the roller and breaks upon attempted lifting therefrom, so that the production cycle is interrupted. The roller mill therefore must closely be observed and as soon as a break occurs, the sheet must manually be laid on the conveyor.

It is the object of the invention to provide a device wherein these disadvantages are averted by automatically removing the cut sheet from the roller.

This is accomplished by using a compounding mill which has the rotating cutting discs offset obliquely relative to each other so that their relative distance is shorter at the roller than above. This has the effect that the sheet cut by the knives is clamped therein due to the rotation and is picked up and carried along, thus is detached from the roler. Because the distance between the two discs again increases at a given point, they release the sheet which then can be carried away by a conveyor without tearing.

According to a further embodiment of the invention, the point of shortest distance between the knives is adjustable along their periphery. This enables regulation of the position of the knives in accordance with the optimal characteristics of the sheet material which depends upon its physical properties such as hardness, elasticity, and the like. In most instances, it has been found opportune to have the point of least distance between the discs behind the contact point of the knives with the roller.

In principle, the angle α formed by the two obliquely offset cutting discs ranges from 2–60°, the lower limit being valid for very hard and the upper limit for extremely soft mixtures, e.g., highly plasticized polyvinylchloride.

It frequently is required or at least advantageous that the material to be rolled is carried to a second roller mill in the shape of small plates for better homogenization.

To cut these plates, a paddle wheel-like transverse knife is provided before the knives, seen in the direction of the rotation of the roller. This transverse knife cuts notches into the sheet. Because the rotary knives are in the same plane, they cut the sheet into plates.

The pressure of the two rotary knives and/or the transverse cutting wheel may be provided by means of pneumatic pistons and cylinders and appertaining control valves, so as to attain the optimal contact pressure which depends upon the plastic or elastomer mixture and the distance of the rollers from each other, i.e., their gap, commonly called the "nip" in the art.

The details of the invention will become more fully apparent by the following description, reference being had to the accompanying drawings. However, it should be understood that these are given merely by way if illustration, and not of limitation, and that it is intended to cover all variations and modifications which do not constitute a departure from the spirit and the scope of the invention as hereinafter claimed.,

In the drawings:

FIG. 1 is a plan view, in schematic, of the device; and

FIG. 2 is a section taken along lines A–B of FIG. 1.

Referring now to these drawings, the roller mill is a 2-roll compounding device having rollers **1** and **2** which may be driven with or without friction. The high-polymer sheet **3** forms on the surface of rotating roller **1** from the mass in the nip and is carried along on it. When it is desired to cut plates, the sheet first meets the rotating transverse cutting wheel **4** which is equipped with radially disposed knives **4***a*. If the plates are to be of equal size, these knives are equidistant from each other. Springs **5** press against bearings **6** of the transverse wheel **4** and urge the same against the roller surface. Knives **4***a* penetrate the rolled sheet **3** and cut the same in transverse direction. The knives **4***a* are carried along by the sheet **3** so that transverse wheel **4** rotates at like peripheral speed as roller **1**. Adjustable stops **7** are disposed on the sides of bearings **6** which face roler **1** and are set in such a manner that knives **4***a* just touch the surface of roller **1**. The rolled sheet **3** then meets the two obliquely offset cutting discs or rotary knives **8** which impart two longitudinal cuts to the sheet. Because the mutual distance of knives **8** is smaller than the width of knives **4***a*, the two cutting operations have the effect that plates **3***a* are cut out of the sheet. Since the distance *a* between both discs **8** decreases toward roller **1**, the plates **3***a* are clamped therein and carried along. Thus, the knives **8** not only cut in longitudinal direction but also lift the plates **3***a* from the roller surface. Because the distance between the two discs **8** again increases beyond a given point, the plates **3***a* are released. They drop onto a guide **9** and slide downwardly thereon. Springs **10** act on bearings **11** of the cutting discs **8** and urge them against the roller surface. The oblique positioning of the knives **8** is attained by means of bushings **12** and **13** on which the knives **8** are rotatably disposed. Bushing **12** is fixed on axle **14** while bushing **13** is set thereon in a manner which locks it against rotational displacement while it is adjustable axially by means of nut **15**. Axle **14** can be turned by maens of lever **16** fastened thereto. The latter may be fixed in any desired position by nut **17**. If thereby is possible to optimally adjust the point **8***a* of the least distance *a* between knives **8** to meet the requirements of any plastic or elastomer mixture.

The plates **3***a* cut out of sheet **3** can readily be carried to another roller mill or the like for further homogenization or to any other fabricating device. If solely a continuous sheet is to be produced, the transverse cutting wheel **4** is inactivated.

What is claimed is:

1. A device for cutting high-polymer sheet formed in the nip of a roller mill which comprises two rotary cutting discs offset relative to each other at an angle, at a predetermined distance from each other and adjustable as to said distance; said knives being disposed above the sheet-carrying roller of said mill and barely contacting said roller; the mutual distance between said discs being shortest at the points closest to said roller.

2. The device as defined in claim 1, wherein said angle is 2 to substantially 60 degrees relative to the surface of said roller, the former serving in cutting of very hard, and the latter for cutting very soft, high-polymers.

3. The device as defined in claim 1, wherein the shortest distance between said discs is behind the contact point of said discs with said roller.

4. The device as defined in claim 1, wherein, for cutting of plates out of said sheets, transverse cutting means are provided, said means cutting before the sheet contacts said discs and comprising a wheel, a plurality of knives axially protruding from said wheel and barely contacting said sheet-carrying roller; and means for urging said wheel and knives against said roller.

5. The device as defined in claim 1, wherein said discs are rotatably disposed on an axle by means of obliquely bored bushings.

6. The device as defined in claim 5, wherein one of said bushings is fixed on said axle; the other being secured against turning but adjustable in axial direction.

7. The device as defined in claim 5, wherein a lever is attached to said axle for purposes of turning the same; said lever being provided with fixing means in any desired position.

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