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PLASTICIZING ROLLING MILLS FOR SYNTHETIC SUBSTANCES

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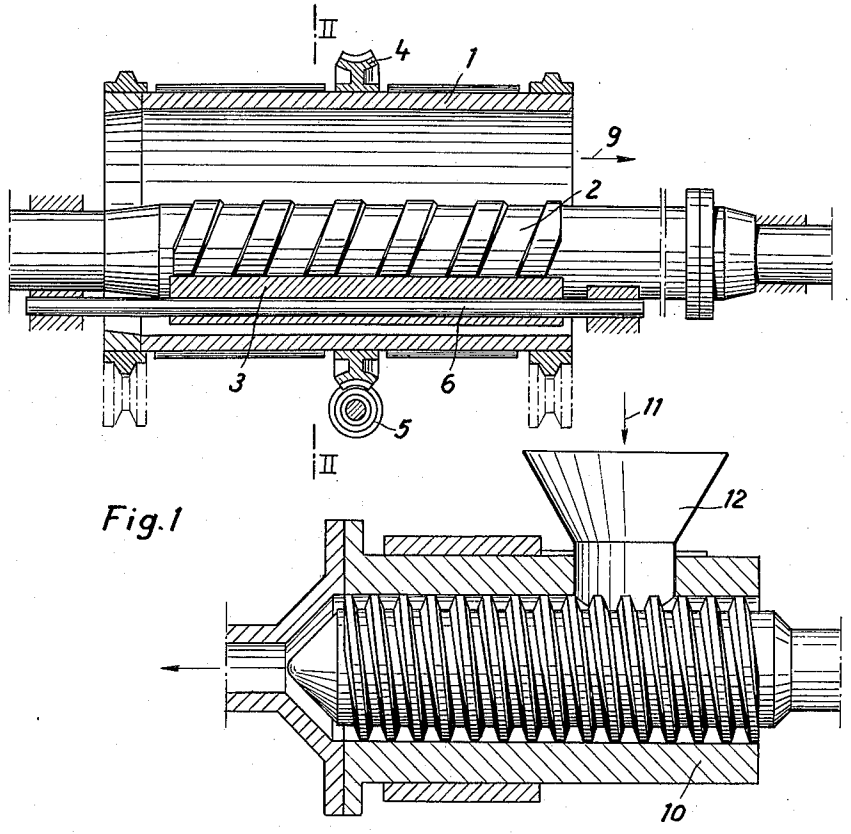
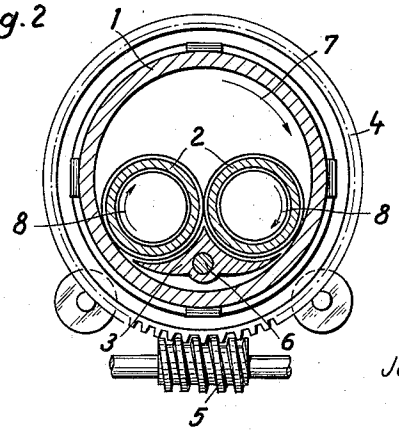


Fig. 1

Fig. 2



INVENTOR

Jean Joseph Gérard Daubenfeld

By his attorneys

Howson and Howson

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PLASTICIZING ROLLING MILLS FOR SYNTHETIC SUBSTANCES

Jean Joseph Gérard Daubenfeld, 12 Rue Astrid, Luxembourg, Luxembourg

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It is known that a very high quality material with uniform gelatinization can be obtained by working synthetic substances, such as PVC plastic, in rolling mills and that better finished products can be obtained from this material by thereafter working it in screw presses.

The known method for working the PVC plastic in rolling mills is unsatisfactory for at least two reasons: it is relatively expensive, entailing high costs for wages; and it is not suitable for producing large quantities of material in a given period of time.

The object of the invention is to devise a continuous and uniformly operating plasticizing rolling mill which can work large and small quantities of material in a given period of time and with which mill it is possible to obtain any desired degree of plasticization. With heretofore known machines it has not been possible to obtain such a variety of plasticization of material being worked.

The plasticizing rolling mill according to the invention comprises essentially a heatable drum rotatable about its axis and at least one roll also rotatable about its axis, extending parallel to the axis of the drum, and cooperating with the inner wall of the drum. A gap or space separates the drum inner wall from the roll or rollers.

Appropriate, known feed and discharge means are associated with the rolling mill and its drum.

Relative movement between the inner wall of the drum and the periphery of the roll or rolls can be regulated as desired within certain limits. Thus the number of revolutions of the drum and of the roll or rolls can be infinitely regulated independently of one another. As a result it is possible to adjust the plasticizing effect as desired.

In addition, the roll or rolls can rotate in either direction in relation to the drum and to each other.

It is also advisable to provide means for displacing the roll or rolls which means allow the gap between the inner wall of the drum and the periphery of the roll or rolls to be adjusted and regulated.

The roll or rolls may be provided with a shallow screw-thread which may be right or left-handed and exerts a feeding effect on the plasticized skin of synthetic substance forming on the inner wall of the drum.

If several rolls are provided they are separated one from another by a space or gap. In the case of rolls with screw-threads, these screw-threads can interengage slightly.

It is likewise possible to provide screw-threads on the inner wall of the drum in order to effect a feeding of the skin of plasticized synthetic substance in the course of its formation.

Between neighbouring rolls arranged in pairs and the inner wall of the drum, a scraper may be provided for detaching the skin of synthetic substance from the wall of the drum and guiding it into the space between the pair of rolls.

The scraper is preferably pivotable about an axis parallel to the axis of the rolling mill. In this manner the skin of synthetic substance can be completely or partly scraped off the inner wall of the drum and conducted between the rolls by the blades of the scraper for further working of the material.

The rolling mill may also be combined with a screw press connected up in series so that the plasticized synthetic material is fed from the rolling mill into the screw press.

An embodiment of the invention is illustrated diagrammetically by way of example in the accompanying drawing, in which:

FIG. 1 is a longitudinal section of a plasticizing rolling mill followed by a screw press, and

FIG. 2 is a section through the plasticizing rolling mill taken on line II—II of FIG. 1.

The plasticizing rolling mill illustrated in the drawing consists of a rotary and heatable drum **1** and two heatable rolls **2** arranged side by side axially parallel to the drum and in the interior thereof, which rolls are rotatable about their axes.

The drum is driven by means which include a worm wheel **4** fixed on the drum and engaged by a driven worm **5**. The drive of the rolls **2** is not shown.

The rolls **2** are mounted in a support which is only indicated in the drawing and which can be adjusted so that a space remains between the periphery of the rolls and the inner wall of the drum. The adjustability of the support can also be extended to the space between the two rolls.

In the embodiment illustrated, the rolls are provided with shallow square screw-threads. They leave a space between their facing peripheries.

The screw-threads of the rolls can interengage slightly.

Between the two neighbouring rolls **2** and the inner wall of the drum **1**, a scraper **3** is arranged. This scraper is of a length corresponding to that of the operating inner wall of the drum. Its purpose is to scrape off the skin of plasticized synthetic material forming on the inner wall of the drum. With it the skin can be completely or partly peeled off the inner wall of the drum. For the purpose of adjustment, the scraper is pivotally mounted on a shaft **6** extending parallel to the axis of the drum. The scraper is so shaped that it conducts the peeled off skin into the space between the two rolls **2**.

The directions of rotation of the drum **1** and of the rolls **2** are indicated by the arrows **7** and **8** respectively. It is evident that these directions can be changed. Thus, for example, the rolls **2** can rotate in the opposite direction to the drum. The two rolls **2** can also rotate in directions opposite to each other.

The direction in which the synthetic substance being worked travels is indicated by the arrow **9**.

In the embodiment illustrated in the drawing, a single screw press **10** is coordinated to the plasticizing rolling mill. This single or multiple screw press can follow the plasticizing rolling mill in horizontal direction or be arranged as shown, perpendicularly below the plasticizing rolling mill. The number of revolutions of the screw press is adapted to the speed of feed and capacity of the plasticizing rolling mill and is infinitely adjustable for this purpose. The arrow **11** indicates the direction in which the material coming from the plasticizing rolling mill drops into the hopper **12** of the screw press. The screw press can be coupled with the plasticizing rolling mill.

In the case of the arrangement according to the invention, the screw press may be of relatively short length as compared with the conventional screw presses, the cylinders of which are about eight to thirty times as long as the diameter of the screw. This construction is possible because in the arrangement according to the invention the screw press is not required to carry out kneading, mixing and plasticizing work but serves primarily for the constant and uniform feeding of the plastic mass. Because of this its construction can be simpler, the cylinder length shorter, and the screw diameter larger than in screw presses which serve primarily to knead and mix.

The rolling mill according to the invention can also be used for other goods, e.g., for chocolate and the like.

I claim:

1. A rolling mill for plasticizing synthetic substances comprising a rotatable drum having an inner wall, at least one operating roller within the drum, the lengthwise axis of the roller lying parallel to the axis around which the drum rotates, said roller lying adjacent said inner wall and having an operative relation therewith for kneading and mixing said substances therebetween, the position of said roller relative to said inner wall being adjustable, and a scraper lying adjacent the length of said inner wall for shaving said substances off said inner wall and for redirecting said substances for further kneading and mixing as they emerge from between said inner wall and said roller.

2. A rolling mill according to claim 1, wherein there are at least two operating rollers lying adjacent said inner wall having an operative relation with said wall and with each other for kneading and mixing said substances between said rollers and between each roller and said inner wall, the lengthwise axis of each of said rollers lying parallel to the axis around which the drum rotates, the position of said rollers relative to said inner wall being adjustable, whereby improved kneading and mixing of said substances not only between said rollers and said inner wall, but also between said rollers themselves, is achieved.

3. A rolling mill according to claim 2, wherein said scraper is positioned between said inner wall and said operating rollers.

4. A rolling mill according to claim 2, wherein said scraper is pivotable around an axis parallel to the axis around which the drum rotates.

5. A rolling mill according to claim 2, wherein said operating rollers are provided with shallow screw threads which engage one another and serve to convey said substances axially.

6. A rolling mill according to claim 5, wherein said drum is heatable and is provided with screw threads at its inner wall for cooperation with the threads on said rollers.

7. A rolling mill for plasticizing synthetic substances comprising a rolling mill according to claim 2 in combination with a mass-deforming worm type press for additional working of said substances.

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J. SPENCER OVERHOLSER, *Primary Examiner.*

MICHAEL V. BRINDISI, WILLIAM J. STEPHENSON, *Examiners.*