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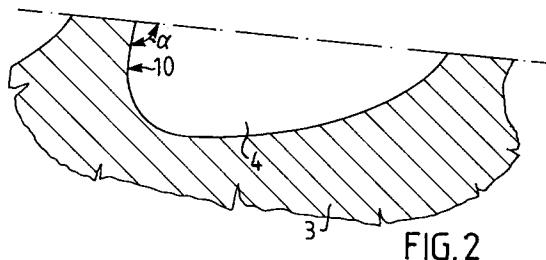
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⑯ **Screw feeder.**

⑯ A screw feeder for lignocellulose-containing material, comprising a conical housing (2) with a screw (3) having a continuous thread (4) for simultaneous feeding and compression. The screw thread (4) is formed so that at least the outer portion of the feed side (10) of the thread is angular so as to form an obtuse angle (α) with the surrounding housing (2).



This invention relates to a screw feeder for lignocellulose-containing material. The screw feeder comprises a conically shaped housing with a screw having a continuous thread for advancing the material through the housing while simultaneously compressing the material.

Screw feeders of this kind are used in the cellulose industry in places where an air-tight material plug is desired for rendering it possible to feed the material against a high pressure (e.g. liquid column and gas pressure). Such screw feeders, thus, are often used for feeding lignocellulose-containing material into an impregnation vessel or digester.

This is a usual application at the manufacture of pulp from so-called annual growth, such as straw, bagasse and other grass and herbs. The screw feeder in this connection serves several purposes in addition to conveying the material. A tight material plug is to be formed and maintained and a.o. has to withstand the digester pressure, which often amounts to 7 Bar and in certain cases is considerably higher. The material must be compressed for pressing out air in order to facilitate the take-up of chemicals. When the material contains great amounts of moisture, superfluous liquid must also be removed by pressing.

The way in which the screw feeder manages to meet these requirements, even at varying production, depends largely on the compression degree and configuration of the screw.

Several problems arising at pulp manufacture by using a screw feeder according to the above have been found to originate from the screw feeder and its mode of operation.

The raw material, together with sand and the like following along with it, subjects the screw and its surrounding housing to wear. This involves costs for maintenance and the risk that the plug to the digester leaves hold, so-called back-blow.

Friction within the raw material and between the same and the surfaces and edges on the feed screw and its housing cause certain parts of the raw material to deform plastically. The resulting particles are only with difficulty accessible for the take-up of chemicals and thereby for delignification, for example in the digestion and bleaching processes. The particles are difficult to separate from the delignified/defibred part of the pulp because of their small dimensions and their density being close to that of the pulp fibres. In the final paper product, the particles appear as small grains or glaze spots.

As it is desired to minimize these undelignified/undefibred particles, it is often necessary to overcharge chemicals, which has negative effects not only on the economy, but also on the strength and dewatering properties of the pulp.

The present invention implies that the aforesaid problems can be reduced. The wear on the screw feeder is reduced, and at the same time problems with glaze spots are avoided. This in its turn has resulted in reduced chemical consumption and improved pulp properties.

In conventional screw feeders the screw thread is formed with an angular feed side so that an acute angle is formed between the thread flank and the surrounding housing. It was now found by surprise that the aforesaid problem is reduced when the screw thread instead is formed so that at least the outward portion of the feed side of the thread is angular so that an obtuse angle with the surrounding housing is formed.

The characterizing features of the invention are apparent from the attached claims.

The invention is described in greater detail in the following, with reference to the accompanying drawing showing embodiments of the screw feeder according to the invention.

Fig. 1 shows a screw feeder according to the invention. Figs. 2 and 3 show two embodiments of a portion of the screw thread on an enlarged scale.

The screw feeder 1 comprises a conical housing 2 and a screw 3 with a screw thread 4. The screw 3 is driven by a motor 5. The material is intended to be supplied through the inlet 6 and be discharged in the form of a plug through the outlet 7, in this case to a pressure vessel 8, e.g. a digester. The liquid possibly pressed out by the compression of the material is collected in a casing 9.

The housing 2 preferably is formed with longitudinal grooves or exchangeable bars, which are intended to ensure that the material advances by counteracting that the material rotates with the screw.

The outlet 7 can be formed conically widening, conically tapering or cylindric, smooth or grooved.

The feed side 10 of the screw thread 4, i.e. the side acting against the advancing material, is formed so that at least the outer portion is angular so as to form an obtuse angle α ($>90^\circ$) with the surrounding housing 2. According to Fig. 2, the greater part of the feed side 10 is angular in this way, while according to Fig. 3 only the outermost portion 11 is angular in this way and the inwardly located portion is angular in the other direction.

The angle α suitably should be between 90 and 130 degrees, preferably between 95 and 105 degrees.

This configuration of the screw thread implies that fine material and other small particles are prevented from penetrating into the gap between the screw thread 4 and the surrounding housing 2. It is thereby prevented that large radial forces and serious wear of the flanks of the screw thread as

well as of the surrounding housing 2 can arise. It was further observed that the aforesaid plastic deformation of the raw material and problems resulting therefrom are reduced substantially.

The invention, of course, is not restricted to the embodiments shown and described, but can be varied within the invention idea.

Claims

1. A screw feeder for lignocellulose-containing material, comprising a conical housing (2) with a screw (3) having a continuous thread (4) for advancing the material through the housing while simultaneously compressing the material, **characterized in** that at least the outer portion of the feed side (10) of the screw thread (4) is angular so as to form an obtuse angle (α) with the surrounding housing (2).
2. A screw feeder as defined in claim 1, **characterized in** that the greater part of the feed side (10) of the screw thread is angular so as to form an obtuse angle (α) with the surrounding housing (2).
3. A screw feeder as defined in claim 2, **characterized in** that only the outermost portion (11) of the feed side (10) of the screw thread (4) is angular so as to form an obtuse angle (α) with the surrounding housing (2) while the inwardly located portion is angular in the other direction.
4. A screw feeder as defined in any one of the preceding claims, **characterized in** that the said angle (α) is 90 to 130 degrees, preferably 95 to 105 degrees.

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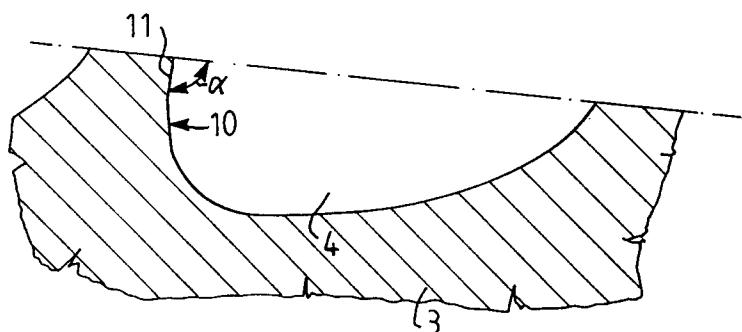
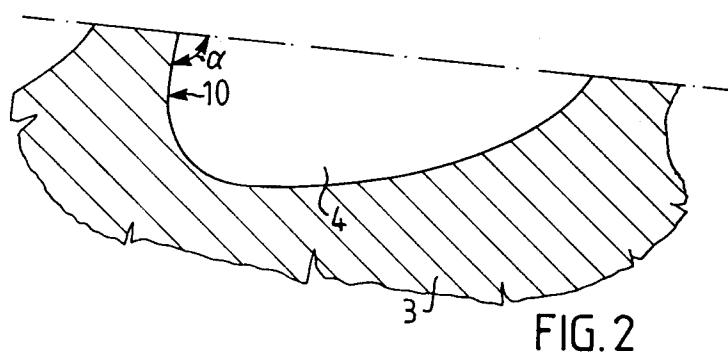
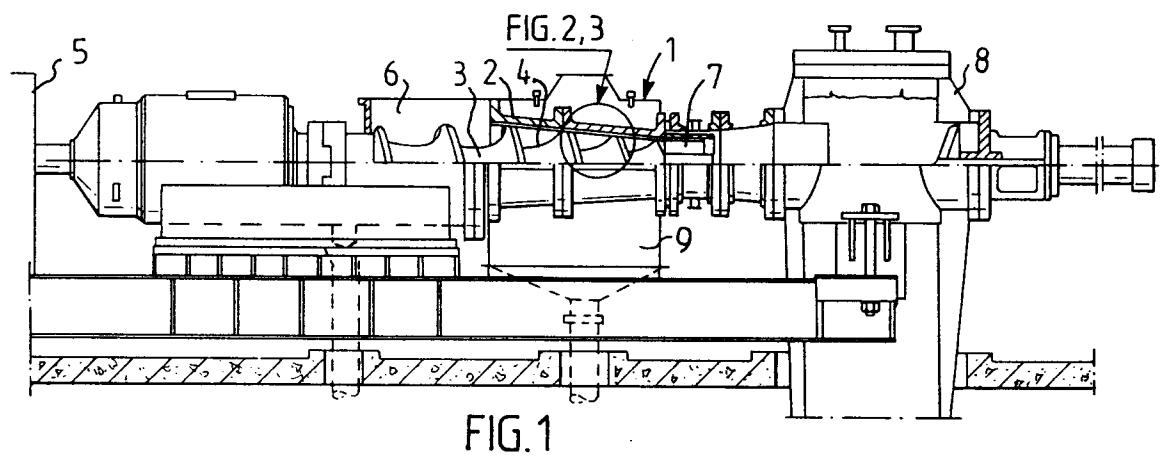
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EUROPEAN SEARCH REPORT

Application Number

EP 92 11 1318.9

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	<p>SE-C-133 227 (PAPER AND INDUSTRIAL APPLIANCES, INC.) *Page 4, column 1, line 36-line 49; figures 1, 2*</p> <p>---</p> <p>-----</p>	1-4	<p>D 21 B 1/30 D 21 D 1/20 D 21 C 7/06</p>
TECHNICAL FIELDS SEARCHED (Int. Cl.5)			
<p>B 02 C D 21 B D 21 C D 21 D</p>			

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
STOCKHOLM	02-11-1992	ASPLUND W.
CATEGORY OF CITED DOCUMENTS		
<p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>		