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Reinhall

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[54] **METHOD OF PRODUCING FIBER PULP FROM VEGETABLE OF FIBROUS MATERIAL**

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[52] **U.S. Cl.** **241/18;** 241/28; 241/65

[51] **Int. Cl.²** **B02C 23/40**

[58] **Field of Search** 241/17, 18, 23, 28, 65

[56] **References Cited**

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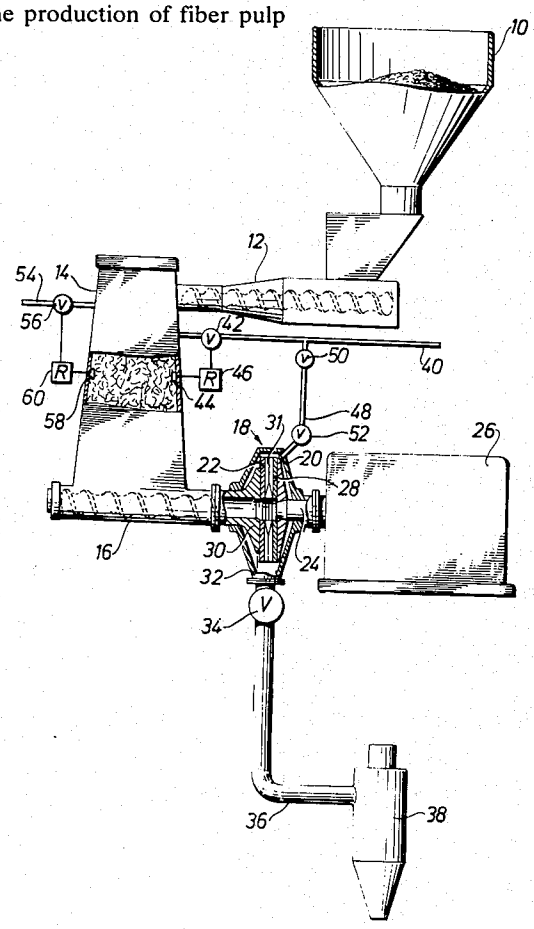
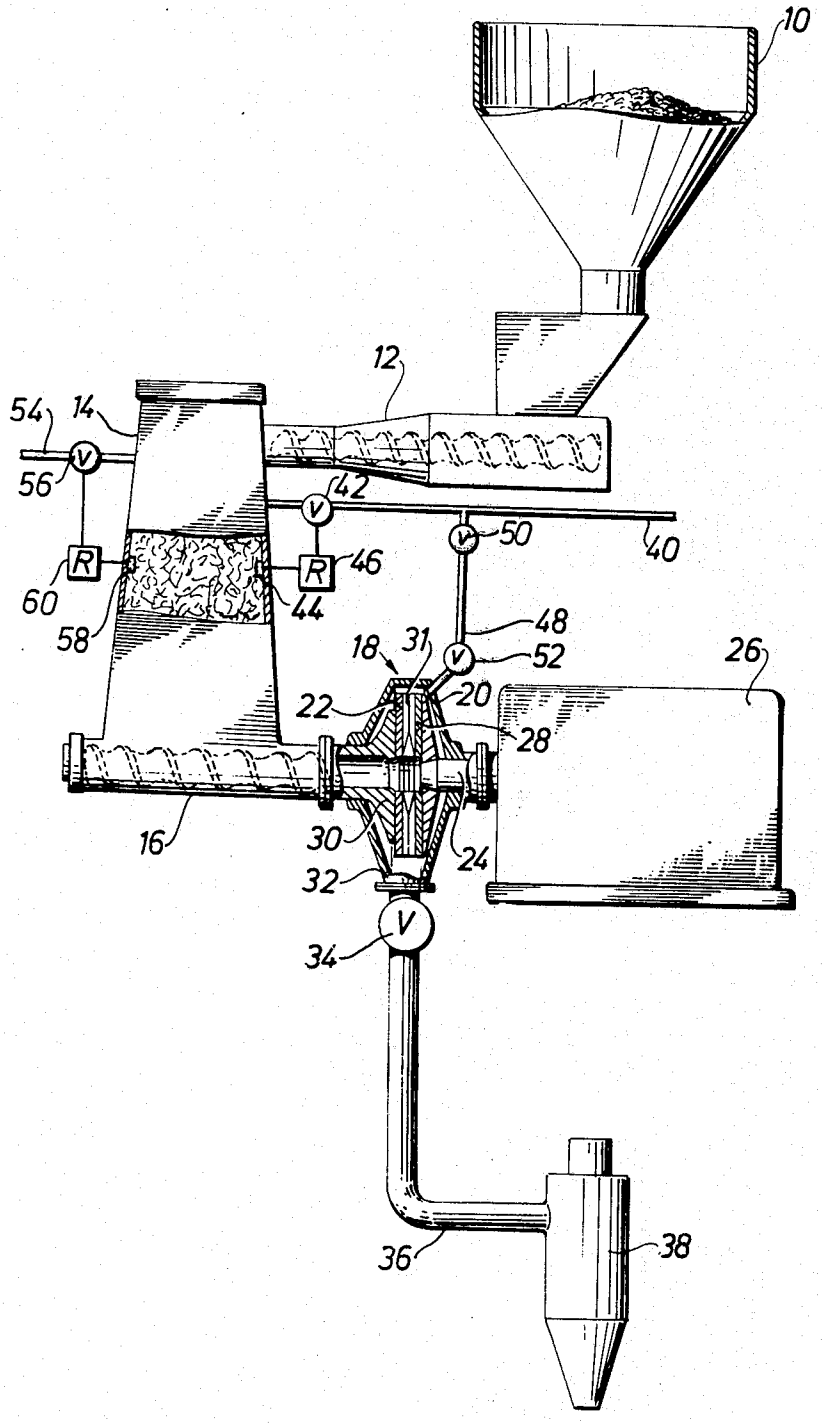
[57] **ABSTRACT**

The invention relates to the production of fiber pulp from fibrous vegetable material by a process generally comprising the steps of preheating the starting material in a closed receptacle by means of steam and thereafter grinding said preheated material between the grinding discs enclosed in a casing of a grinding apparatus under superatmospheric pressure. As the pressure in the preheating receptacle during the whole treatment of the material must exceed the superatmospheric pressure in the grinding apparatus proper in order to prevent back flow of steam and material, the invention provides novel means for maintaining the pressure difference in consideration by introducing another gaseous pressure agent than steam into the preheating receptacle. This renders possible to keep the starting material in the receptacle at a lower temperature than that corresponding to that of a pure steam atmosphere under the same increased pressure. The additional pressure generated in the preheating vessel by the introduced other gaseous agent also assists in the discharge of the ground produce from the grinding casing upon treatment between the grinding discs. The additional gaseous agent can also be used as a cooling agent. The reduced temperature in the preheating vessel protects the material to be ground, in particular wood chips to be subjected to the so called thermomechanical grinding method, against discoloration and improves also the grindability of said material.

5 Claims, 1 Drawing Figure

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METHOD OF PRODUCING FIBER PULP FROM VEGETABLE OF FIBROUS MATERIAL

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a method of producing fiber pulp from vegetable or fibrous material.

More particularly this invention relates to a method in the production of fiber pulp from vegetable or fibrous material such as wood chips and comprising preheating of the starting material in a closed receptacle by means of steam and thereafter grinding said material under superatmospheric pressure in a grinding apparatus between grinding discs provided therein.

2. Description of the Prior Art

In the prior art preheating processes the preheating temperature may be below or over 100°C, and hitherto the pressure in the receptacle has been adjusted to correspond with the desired temperature. When the preheated starting material such as the chips are introduced into the grinding apparatus steam is generated during the grinding between the grinding discs. To prevent back flow of steam into the receptacle it is obviously necessary to maintain a higher pressure in the receptacle than in the grinding casing.

This is especially valid if a separate gaseous carrier agent, such as steam under pressure, is introduced into the grinding casing to assist in the discharge of the ground pulp from the casing or an exhaust valve provided in the outlet thereof as is disclosed e.g. in the commonly assigned co-pending U.S. Pat. application Ser. No. 299,259, filed Oct. 20, 1972, now Pat. No. 3,847,363, issued Nov. 12, 1974 and commonly assigned co-pending U.S. Pat. application Ser. No. 316,290, filed Dec. 18, 1972.

SUMMARY OF THE INVENTION

One main object of the invention is to provide a method which in a more reliable manner than hitherto renders possible to maintain a higher pressure in the preheating receptacle than in the grinding casing.

Another object of the invention is to provide a method which in addition facilitates the discharge of the pulp ground between the grinding disc from the casing enclosing said disc.

Still another object of the invention is to provide a method by which the properties of the ground produce are improved over the optimum results obtainable hitherto by a grinding treatment of the kind in consideration in particular by avoiding the danger of discoloration of the pulp.

According to one main feature of the invention another gaseous agent than steam is supplied to the preheating receptacle in order to maintain the required higher pressure therein. In this manner it is possible to adjust the temperature in the preheater to a level which is most advantageous for the starting material e.g. for avoiding discoloring thereof. According to the invention the pressure agent supplied to the receptacle further has a cooling effect also inside the grinding zone between the grinding discs at the moment when the fibers are uncovered from one another. By applying the invention the quality of the produced pulp, e.g. color and grindability is affected in an favorable manner. The invention is especially applicable to the so called thermomechanical method in which the grinding is effected without assistance of particular chemicals.

SHORT DESCRIPTION OF THE DRAWING

Further objects, features and advantages of the invention will become apparent from the following description considered in connection with the accompanying drawing, which diagrammatically in a lateral view shows a plant enabling to carry out the method of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing reference numeral **10** denotes a storage bin for the starting material such as wood in disintegrated state or so called chips. The starting material is introduced by a feeding device **12** such as a screw, into a vessel or receptacle **14** which is maintained under a predetermined pressure, the feeding device sealing against said pressure. The vessel **14** is at its bottom through a conveyer screw **16** connected to a grinding apparatus **18** of the disc type which comprises a closed casing **20** within which are located a stationary grinding disc **22** and a grinding disc **28** mounted within the frame **26** rotatably about a shaft **24.** The starting material supplied by the conveyer screw **16** is fed through a central opening at the inner periphery of an interspace **31** existing between the two grinding discs **22, 28.** The surrounding grinding casing **20** has e.g. at its bottom an outlet **32** which houses an exhaust valve **34** by which the free passage area of the outlet is controlled. The outlet **32** may over a duct **36** communicate with a centri-cleaner **38** for separating off the steam accompanying the ground produce.

Steam under superatmospheric pressure is fed from a pressure source not shown through a pipe **40** to the vessel **14.** In this connection a valve **42** is mounted in the pipe **40** which valve is actuated by an implement **44** sensing the temperature within the zone and a temperature regulating device **46** so that a desired temperature is maintained in the vessel **14.** This temperature may be below or over 100°C and may amount to 90° – 140°C, for example. At the same time, a steam pressure at or exceeding atmospheric pressure may prevail in the vessel.

Through a pipe **48,** within which a manually or regulator-controlled valve **50** is provided, steam can be fed to the grinding casing **20** from the pipe **40.** The pipe **48** may also include a non-return valve **52.**

A pipe **54** from a source (not shown) of compressed air opens into the vessel **14,** said pipe housing a valve **56** which controls the supply of compressed air to the vessel **41** through an implement **58** sensing the pressure in the interior of the vessel and a regulator **60** for adjustment to desired pressure in the vessel.

OPERATION OF THE PREFERRED EMBODIMENT

The starting material which is supplied to the preheater vessel **14** contains water to 30 – 60 percent, for example. This material is preheated inside the vessel to predetermined temperature before it is fed by the conveyer screw into the interspace **31** between the grinding discs **22, 28.** By the grinding work and the friction heat developed thereby steam is generated. In addition, steam can be supplied to the casing through the pipe **48** in order to facilitate the discharge of the final pulp out of the grinding casing. Both these factors cause, as is well known, an increase of pressure within the grinding casing, and in order to prevent steam from penetrating

backwards into the vessel **14** air is now supplied to this latter, so that required excess pressure is obtained by addition of the steam and air pressures in the vessel. In this way a temperature can be maintained in the vessel which is substantially lower than that which corresponds to an atmosphere of solely steam at the same pressure. The temperature of the starting material or chips in the vessel **14** can now be adjusted in the most favorable way to prevent discoloration of the chips and to obtain forced feeding of the introduced starting material through the grinding interspace **31.** In addition, the supplied air acts as cooling agent during the grinding procedure proper between the grinding discs and has there influence also on the brightness and, otherwise, grindability of the pulp. The grinding can with excellent result be effected without or with a limited addition of chemicals of conventional type such as a mixture of disulphite and sulphite, for example.

Instead of air other gases which do not condense in the vessel or are neutral to the starting material can be utilized as pressure agent in the vessel **14.** The gaseous agent may have a bleaching effect on the chips as is the case with gaseous SO_2. The carrier agent supplied under pressure through the pipe **48** need not be steam, but may also be constituted by air, for example. The invention can to advantage be combined with the structure which is disclosed in the U.S. Pat. applications Ser. Nos. 299,259 and 316,290 referred to above.

While one embodiment of the invention has been disclosed and described with indication of some possible modifications, it is to be understood that this is for purpose of illustration only, and that the invention is not to be limited thereby, but its scope is to be determined by the appended claims.

What is claimed is:

1. In a method for producing fiber pulp from fibrous vegetable material wherein the fibrous material is preheated in a closed receptacle by means of steam and thereafter ground between grinding discs under superatmospheric pressure in a grinding apparatus casing communicating with the closed receptacle, the improvement comprising the step of supplying a gas other than steam to the closed receptacle at a pressure and temperature so as to maintain the total pressure in the preheater receptacle greater than the pressure in the grinding casing without increasing the temperature in the receptacle above that temperature prevailing therein due to the preheating by steam.

2. The improved method as claimed in claim **1** wherein a gas is introduced into the grinding apparatus casing to further increase the pressure therein to facilitate the discharge of ground pulp therefrom further including the step of maintaining the pressure in the preheater receptacle at a pressure greater than the increased pressure in the casing.

3. The improved method as claimed in claim **1** further including sensing the temperature in the preheater receptacle by a temperature sensing device, controlling the supply of steam to the preheater receptacle in response to the temperature sensed to maintain the temperature at a desired predetermined level for preheating, sensing the total pressure in the preheater receptacle and controlling the supply of the gas other than steam to the preheater receptacle in response to the pressure sensed to maintain the total pressure therein greater than the pressure in the grinding casing.

4. The improved method as claimed in claim **1** wherein the gas other than steam supplied to the preheater receptacle is one which is capable of bleaching the vegetable fiber.

5. The improved method as claimed in claim **2** wherein the gas introduced into the grinding apparatus casing to further increase the pressure therein is steam.

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