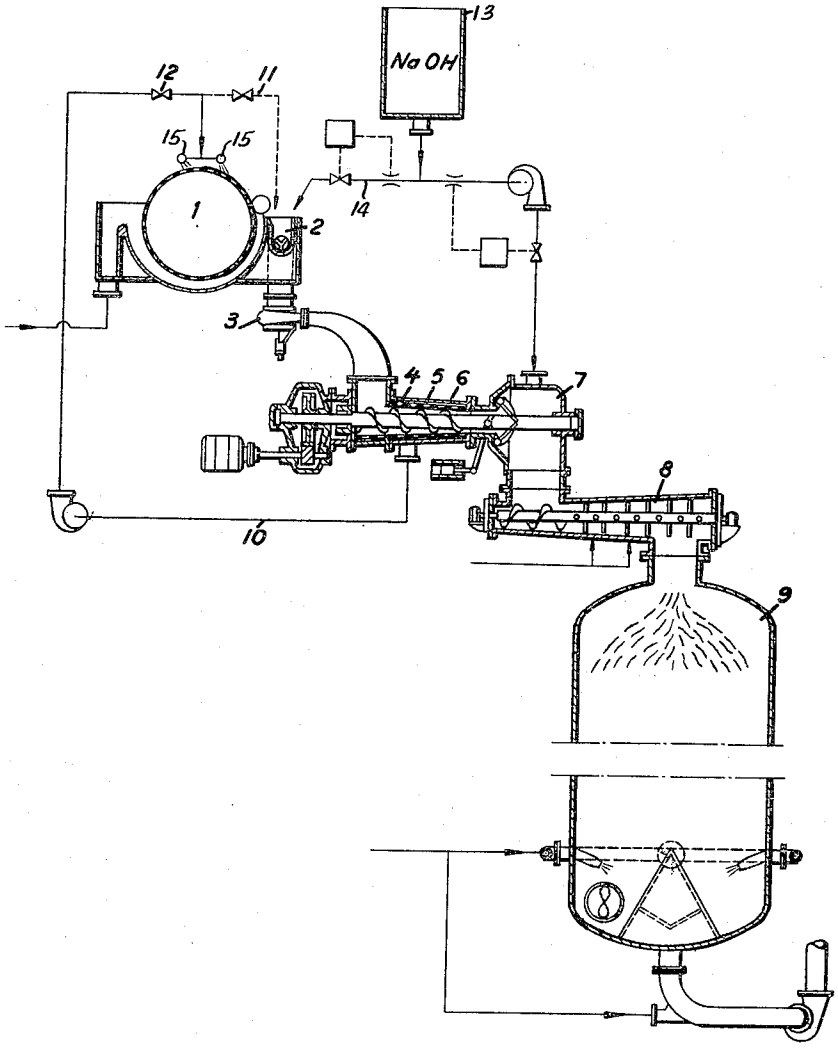
June 26, 1962 J. C. F. C. RICHTER 3,041,233

METHOD OF INTRODUCING HIGH DENSITY PULP INTO A PRESSURE VESSEL

Filed Dec. 17, 1957



INVENTOR:

Johan C.F.C.Richter,

BY Cushman, Darby & Cushman

ATTORNEYS.

United States Patent Office

3,041,233
Patented June 26, 1962

3,041,233
METHOD OF INTRODUCING HIGH DENSITY PULP INTO A PRESSURE VESSEL

Johan Christoffer Fredrik Carl Richter, Karlstad, Sweden, assignor to Aktiebolaget Kamyr, Karlstad, Sweden, a Swedish company

Filed Dec. 17, 1957, Ser. No. 703,436
2 Claims. (Cl. 162—18)

The present invention relates to the preparation of high density pulp.

In order to obtain pulp having an alpha cellulose content of 95 to 96% by treatment with hot alkali, it has been proven economical to keep the pulp density as high as possible, not only in order to save steam of the required temperature, 115 to 130° C., but primarily to conserve alkali. When the pulp is of the usual density of 12 to 18%, a surplus of alkali must be added in order that the amount of alkali required for obtaining the desired result should be consumed in a reasonable length of time and that a reaction vessel of a reasonable volume can be employed.

It has been proposed to introduce pulp of a density of 20 to 30% into a pressure vessel by means of special feeding apparatus such as rotary valves, pistons, feed screws, etc.

Ordinary pumps for feeding pulp are employed for pulps of a density of 6 to 8%, or, in exceptional cases, for pulps of a density of 12 to 15%. However, no pump presently manufactured is capable of feeding pulp of a density of e.g. 30% against a superatmospheric pressure of 1 to 2 atmospheres.

Accordingly, it is an object of the present invention to devise a novel and improved method for feeding high density pulp into a pressure vessel.

Another object is to devise a novel pulp feeding apparatus.

It is a further object to continuously introduce cellulosic pulp having a density of at least 18% into a pressurized vessel by a more economical and efficient method than has previously been possible.

Still further objects and the entire scope of applicability of the present invention will become apparent from the detailed description given hereinafter; it should be understood, however, that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

It has now been found that these objects can be obtained by combining a conventional pump with a screw press, the latter being in direct association with or located within the pressure vessel itself so as to operate at the pressure within the vessel. In this manner low density pulp, e.g. pulp of density 6–15%, preferably 9 to 12% is pumped from atmospheric pressure to superatmospheric pressure at the inlet of the screw press and is concentrated to a high density pulp having a dry content of 15 to 20% or higher as the pulp is passed through the screw press into the pressure vessel. Preferably the high density pulp formed has a density of 18% or more and most preferably has a density of 25 to 30%.

While the present invention relates in general to a method of continuously introducting high density pulp into a reaction vessel under pressure it is preferably employed with a digester for the alkali treatment of pulp in a bleach plant.

As the alkali there can be employed sodium hydroxide, potassium hydroxide and calcium hydroxide etc.

In general .5 to 10% of sodium hydroxide (or other alkali) is added based on the dry weight of the pulp.

The pressure in the superatmospheric pressure vessel is generally 1 to 2 atmospheres above normal atmospheric pressure.

Since the alkali is continuously recycled in the instant process only sufficient make-up alkali need be added to replenish that used up in the process.

The invention will be more particularly described hereinbelow with reference to the accompanying drawing, which diagrammatically shows a preferred embodiment for carrying out the invention.

Example 1

In the drawing, **1** designates a wash filter, to which cellulosic pulp is fed from a chlorination step of a bleach plant not shown. The pulp washed on this filter is mixed with sodium hydroxide in a mixer **2** following the filter to give a concentration of 5% sodium hydroxide based on the dry weight of the cellulose. From the conventional mixer the pulp having a density of 12% flows to the pressure pump **3**. The pump forces the pulp through the screw press **4** which is provided with a sieve **5** and is built into a housing **6**. The housing is directly connected to a pressure chamber **7** which in its turn is connected to the reaction vessel **9** via the mixer **8**. Steam is supplied to the mixer **8** for raising the temperature from 60° C. to about 125° C. in the pressure chamber **7**. In the screw press, sodium hydroxide solution is pressed off the pulp, so that its density rises from 12% to 30%. The sodium hydroxide solution (lye), usually containing some fibre, is pumped back through the conduit **10** to the filter **1** and is supplied to the spray tubes **15** of the filter in order to displace the treating liquid remaining in the pulp from the preceding chlorination step. By means of a valve **12** the quantity of returned lye taken out of the conduit **10** is controlled, i.e. the quantity of lye taken out of the screw press **4**, **5**, **6**. If the filter delivered a pulp web having a density of 12% to the mixer **2** and the pump **3**, and if the valve **12** were held closed, so that no lye was returned, the final density of the pulp in the pressure digester **9** also would be 12% (disregarding the slight dilution caused by condensation of steam in the main mixer **8**). On the other hand, if a lye quantity of 5 liters per kilogram dry pulp is taken out of the screw press and returned through the conduit **10** and the valve **12**, the pulp originally having a density of 12% and thus containing 7.33 liters of water per kilogram fibre is relieved of 5 kgs. of its water. Therefore, after the screw press the pulp contains merely 2.33 liters of water per kilogram of fibre which corresponds to a pulp density or dry content of 30%.

As shown in the drawing, make-up sodium hydroxide is added from vessel **13** through line **14** to maintain the amount of alkali constant.

Example 2

Example 1 was repeated but the 12% pulp leaving filter **1** was diluted to a density of 8% by means of additional lye of 10% concentration supplied through **11**. The pulp was concentrated to a pulp density of 30% as in Example 1.

I claim:

1. A method for the continuous treatment of pulp with a treating liquid in a treating vessel operated at superatmospheric pressure, said method comprising mixing treating liquid with the pulp at atmospheric pressure to form a low density mixture of a density not over about 12%, pumping the resulting low density mixture into an extracting zone at a pressure equal to the superatmospheric pressure in said vessel, pressing said mixture in said extraction zone to extract liquid therefrom and form

a high density pulp of a density of about 25 to 30% and then discharging this high density pulp from said extraction zone into the vessel and treating the pulp therein.

2. A method for the continuous bleaching of cellulosic pulp in an alkali treating vessel operated at superatmospheric pressure which comprises mixing alkali with the pulp to form a low density mixture at atmospheric pressure of about 9–12% density, pumping the resulting low density mixture at a pressure equal to the superatmospheric pressure in the vessel into an extracting zone wherein the pressure on said mixture is maintained essentially equal to the pressure within said vessel; pressing said mixture while in said zone to extract enough liquid therefrom to raise the density thereof to about 25–30% and then feeding said high density pulp into said vessel.

References Cited in the file of this patent

UNITED STATES PATENTS

1,354,528	Wertenbruch	Oct. 5, 1920
1,876,064	Lang	Sept. 6, 1932
2,018,937	Wells et al.	Oct. 29, 1935
2,355,091	McDonald	Aug. 8, 1944
2,383,684	Richter	Aug. 28, 1945
2,673,690	Segl	Mar. 30, 1954
2,858,213	Durant et al.	Oct. 28, 1958
2,862,813	Birdseye	Dec. 2, 1958

FOREIGN PATENTS

852,892	France	Nov. 9, 1939
548,271	Great Britain	Oct. 2, 1942
119,936	Sweden	Oct. 14, 1947