# UNITED STATES PATENT OFFICE.

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## PROCESS OF DISSOCIATING WASTE LYE FROM THE SULFITE-CELLULOSE MANUFACTURE.

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*To all whom it may concern:*

Be it known that I, INGVAR SÖRAAS, a citizen of Norway, residing at Indre Aalvik, Hardanger, Norway, have invented certain new and useful Improvements in Processes of Dissociating Waste Lye from the Sulfite-Cellulose Manufacture, of which the following is a specification.

It is a well known fact that the waste liquor from the manufacture of wood pulp and other pulp by the sulfite process may be dissociated by the use of oxidizing agents under high pressure and at a high temperature. It has heretofore been proposed to heat the waste liquor, from which the pulp has been separated, to a temperature of about 100° C., while introducing an oxidizing gas, such as air, said heating being effected under superatmospheric pressure, in an autoclave, during which operation the free $SO_2$, together with that combined with lime as bisulfite becomes oxidized to $SO_3$, and whereby the lignin material is precipitated, but it is found that during such operation sulfate of lime is produced, this being precipitated, and forming a coating on the surfaces of the heating elements. The first part of the heating, for the dissociation of the liquor solids must, for economical reasons be effected by means of exhaust steam, and the coating of the heating elements with calcium sulfate very materially decreases the efficiency of the heating operation. During the oxidization of the sulfur compound, considerable heat is liberated, the amount of which is usually sufficient to raise the temperature of the liquor by about 20 degrees C. This of course further decreases the efficiency of the heating operation, since in order to get efficient heating by exhaust steam, it is necessary to have a wide temperature difference between this steam and the liquor to be heated.

One method which has been proposed, for the overcoming of these difficulties, is to first treat the waste liquor with sodium bisulfate, for the precipitation of the calcium as sulfate and the removal of this before the heating with air under pressure is effected. This of course requires the use of a large supply of bisulfate, which in many cases considerably increases the cost of the final product.

In accordance with the present invention, a different procedure is followed, as follows:

The waste liquor is first heated, preferably in an autoclave, by exhaust steam, up to such a temperature (about 80° C.), that the heat produced by oxidation subsequently, will raise the temperature to about 100° C. and this operation is effected in an atmosphere consisting of non-oxidizing gases, or gases which have only slight oxidizing power. This operation can be carried out at atmospheric, or at a higher pressure. Thereafter, as the second step of the process, the liquor is transferred to another autoclave and is heated therein somewhat, preferably by the introduction of live steam or superheated steam, while compressed oxidizing gases, such as compressed air, or the like, are introduced. This air or oxygen oxidizes the sulfur compounds, producing a precipitation of calcium sulfate, simultaneously with the precipitation of the lignin material, but the precipitation of calcium sulfate at this stage of the operation is not objectionable, since there are no heat interchange elements employed in the second autoclave. The oxidation in the second autoclave produces heat, and the temperature of the liquor may rise about twenty degrees, from this cause. This oxidation treatment is preferably effected under a considerable super-atmospheric pressure.

As the gases for the first step of the process, I find it preferable to employ the waste gases from the second step of the process, the oxidation of the sulfur compounds in said second step removing the major portion of the free oxygen therefrom. I find that it is not necessary to employ, during the first step of the process, such a high pressure as is required in the second step.

The lignin material produced may be employed, either alone or with other materials, as a fuel, and the presence of precipitated calcium sulfate therein, while of course increasing the ash content materially, is not particularly objectionable.

I claim:

1. A process of precipitating lignin material from the waste liquor separated from pulp made by the sulfite process, which comprises firstly, heating up the said liquor while confined in an atmosphere of a non-

oxidizing gas, to a temperature of not materially below 80° C., and, secondly, subjecting the said liquor to the action of an oxidizing gas under superatmospheric pressure, while raising the temperature of the liquor to about 100° C., until said lignin material is precipitated.

2. In the process as set forth in claim 1, the improvement which comprises introducing compressed air into the liquor during the "second" heating operation, whereby the oxygen content of said air becomes considerably decreased, and thereafter conveying the remaining gas to the containers in which the "first" operation is carried out whereby the exit gas of the "second" operation is used as the non-oxidizing gas for the "first" operation.

In testimony whereof I have affixed my signature in presence of two witnesses.

INGVAR SÖRAAS.

Witnesses:
AXEL LAKIR,
HAROLD NALM.

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