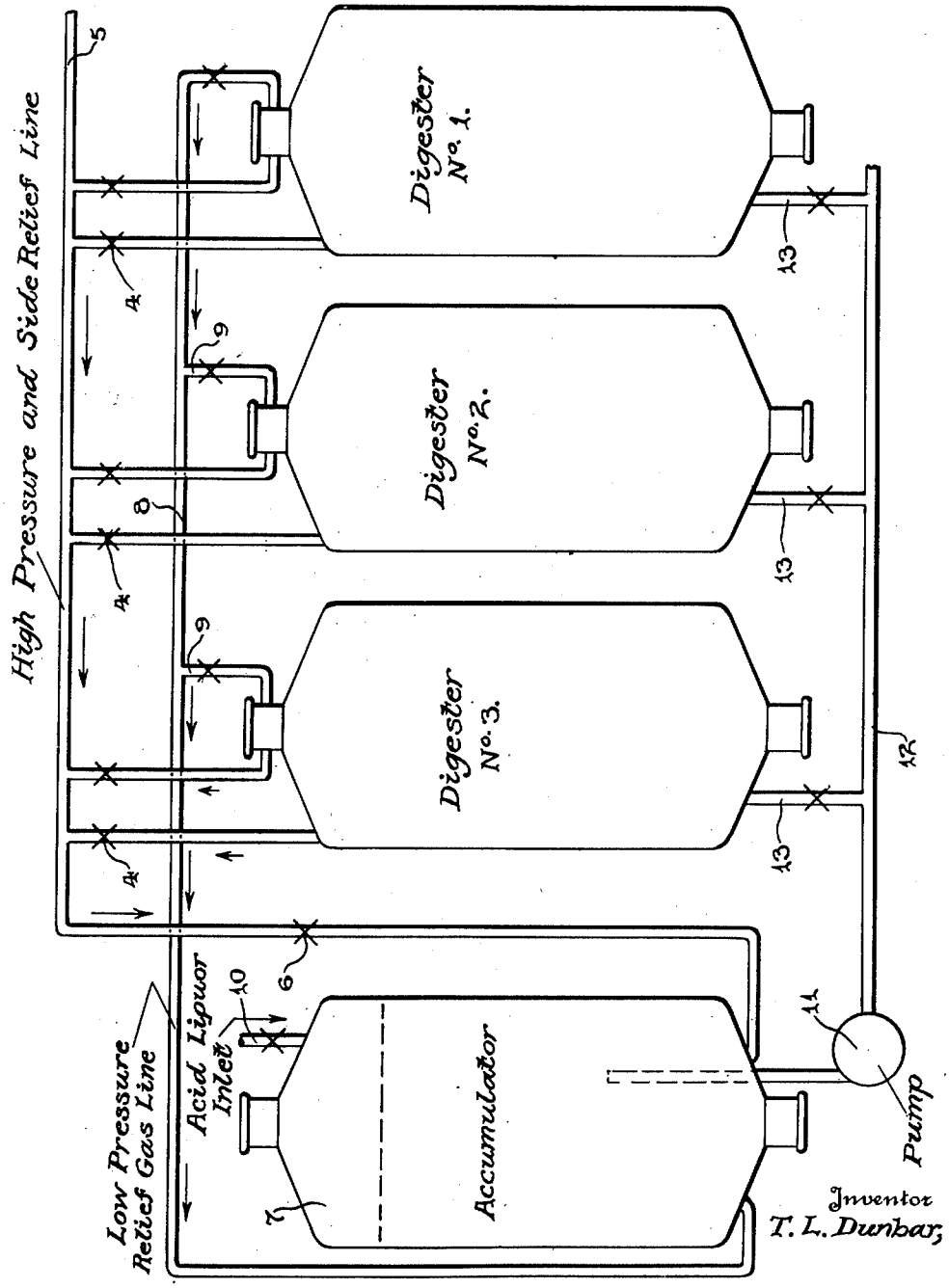
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DIGESTION OF FIBROUS MATERIAL

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DIGESTION OF FIBROUS MATERIAL

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The present invention pertains to the cooking of fibrous material, and more especially to the packing of wood chips or the like, into digesters, while pre-cooking such fibrous material.

Prior to this invention, proposals have been made for utilizing hot waste liquor from blow pits, storage tanks and the like for assisting in packing chips in digesters, and for preconditioning such chips. In these proposals, a great amount of heat is lost from the waste liquor before it is used for packing purposes, and the primary object of the present invention is to eliminate such waste. This is accomplished mainly by introducing side relief liquor and/or high pressure gas from one or more digesters directly into the upper portion of another digester, while the latter is being filled with chips.

With the foregoing object outlined, and with other objects in view which will appear as the description proceeds, the invention consists in the novel features hereinafter described in detail, illustrated in the accompanying drawing, and more particularly pointed out in the appended claims.

The accompanying drawing shows a diagrammatic view of a suitable apparatus for use in carrying out my method.

In this drawing, the digesters Nos. 1, 2 and 3 are connected by the usual valved side relief and high pressure gas relief branches 4, with a relief line 5, which is provided with a control valve 6, and leads to the bottom of an accumulator 7, in which acid liquor may be preheated and pre-conditioned for use in the digester.

A low pressure gas relief line 8 is connected by valved branches 9 to the upper ends of the digesters, and this line also leads gases and vapors from the tops of the digesters into the bottom of the accumulator. The cold acid liquor may be introduced into the top of the accumulator through a conduit 10, and in the accumulator, this liquor will absorb the gases and be preheated and pre-conditioned by the material received from the lines 5 and 8.

In accordance with the present invention, whenever one of the digesters is being filled with chips or the like, side relief liquor and/or high pressure gas from one or more of the other digesters may be fed through the pipe 5, directly to the digester undergoing filling, instead of being led to the accumulator. In accordance with my method of operating, we will assume that No. 2 digester is on the side relief period of the cooking operation, that is, it has just recently been filled, and its side relief branch 4 is opened, so that the usual liquor is flowing off through the side relief. Instead of sending this liquor back into the accumulator, as has heretofore been the practice, I shut the valve 6 and open the valve in the side relief branch 4 of digester No. 3, then as the chips fall into No. 3 digester, which is being filled, the side relief liquor coming from digester No. 2 flows in on top of these chips, and packs the chips more evenly in the digester. This also, in addition to packing the chips, conditions them, as the liquor coming from No. 2 digester is hot, and this hot liquor flowing into No. 3 digester, as the same is being filled, starts penetrating the chips, as they fall into the digester, and by giving all the chips very nearly the same hot moisture content, in reality actually starts the cooking process.

As No. 3 is filling with chips hot high pressure gas from digester No. 1 may also be added to the hot liquor flowing through the side relief branch 4 of No. 3. Consequently, the side relief liquor packs the chips in digester No. 3 and partially conditions them. In addition, the high pressure gas going into the digester and meeting the flowing stream of chips which is falling into this digester, has the effect of penetrating the chips due to absorption, so that the chips not only absorb liquor but also some SO_2 gas. This initiates the digestion process.

At this point I wish it to be particularly noted that in accordance with my invention, no additional apparatus is necessary for the storage of hot liquor, as I utilize the already existing side relief branch, and simply flow the hot liquor and hot gas through the same from one or more digesters on the side or high pressure relief, into another digester that is undergoing filling.

This method saves considerable on the cooking period, as by the time the digester is filled, the chips have already taken up considerable hot liquor and gas. As soon as digester No. 3 is filled with chips, the valve in its side relief branch is closed, and the valve 6 is again opened, so that any further side relief from digester No. 2 or high pressure relief from No. 1 will now go directly into the accumulator for use in pre-heating and pre-conditioning the acid liquor therein. Furthermore, as soon as digester No. 3 is filled with chips in the manner above explained, acid from the accumulator is forced into the bottom of this digester by means of a pump 11 that is interposed in a feed pipe 12 which is connected to the bottoms of the digesters by means of valved branches 13. The acid is pumped into digester No. 3 until the same is completely filled with chips, and liquor. Then the cooking of this digester proceeds in the normal manner, except that due to the fact that hot relief liquor and gas were run into this digester during the filling, and the further fact that hot acid was pumped from the accumulator into the digester, very little steam is required at the start of the cook.

It will be understood that the hot side relief liquor and high pressure gas are used in the filling of any one of the digesters, and that my improvements, while shown for use with a battery of three digesters, may be employed with any number of digesters.

In accordance with my present invention, I have not only provided a system for effectively absorbing the gases relieved from the digesters, and for utilizing the heat units thereof, but have furnished a method whereby the chips are not only initially pre-conditioned during the filling of the digester, but are in effect pre-cooked before any steam is turned into the digester.

It is manifest that various changes may be made in the details disclosed, without departing from the spirit of the invention, as expressed in the claims.

What I claim and desire to secure by Letters Patent is:

1. In the digestion of fibrous material, flowing side relief liquor from a digester undergoing cooking, directly into a digester undergoing filling, and utilizing said side relief liquor for packing chips evenly in a digester.

2. In the digestion of fibrous material with acid liquor, releasing hot acid liquor and gas from digesting means and flowing the same directly into the upper portion of another digester while filling the latter with fibrous material.

3. In the digestion of fibrous material with acid liquor, utilizing hot acid fluid from digesting means for packing fibrous material into a second digester, and afterwards forcing hot pre-conditioned acid liquor into the second digester.

4. In the digestion of fibrous material, flowing hot acid liquor from a digester into a second digester undergoing filling, and causing said hot acid liquor to pack the fibrous material in the second digester, cutting off the flow of hot acid liquor from the first digester to the second digester and then forcing hot acid liquor from an extraneous source into the second digester to completely fill the latter with fibrous material and acid liquor.

5. In the digestion of fibrous material, flowing hot acid liquor from the upper portion of a digester undergoing cooking, directly into the upper portion of a second digester while the latter is being filled with fibrous material, cutting off the flow of acid liquor from the first to the second digester after the desired amount of fibrous material has been placed in the second digester, and then forcing hot acid liquor from an extraneous source into the second digester to completely fill the latter with fibrous material and hot acid liquor.

6. In a method of the character described, cooking fibrous material with acid liquor in a digester, flowing side relief hot liquor from said digester into acid liquor contained in an accumulator, cutting off the flow of side relief liquor from the digester to the accumulator, and then flowing said side relief liquor directly into the upper portion of a second digester, while the latter is being charged with fibrous material, cutting off the flow of side relief liquor from the first to the second digester, and forcing hot acid liquor from the accumulator into the second digester to completely fill the latter with fibrous material and hot acid liquor.

7. In a method of the character described, digesting fibrous material with acid liquor in a closed digester, passing side relief liquor from said digester into acid liquor contained in an accumulator, cutting off the flow of side relief liquor from the digester to the accumulator, and flowing this side relief liquor directly from the digester to a second digester while the latter is being filled with fibrous material, cutting off the flow of the side relief liquor from the first to the second digester and returning said flow to the accumulator, then forcing hot acid liquor from the accumulator into the second digester chamber to completely fill the latter with fibrous material and acid liquor, and passing top relief gas from the first digester into the accumulator for pre-conditioning and pre-heating the acid liquor contained therein.

8. In the digestion of fibrous material, utilizing gases, vapors and liquor released from digesters undergoing cooking for pre-heating and pre-conditioning acid liquor in an accumulator, flowing hot acid liquor from

one digester directly into another digester while the latter is being filled with fibrous material, cutting off the flow of acid liquor to the last mentioned digester after a predetermined mass of fibrous material has been deposited therein, and then forcing hot acid liquor from the accumulator into the last mentioned digester to completely fill the latter with fibrous material and acid liquor.

9. In a system of the character described feeding fibrous material into the top of a digester, and flowing hot acid liquor from the upper portion of a digester undergoing cooking, directly into the upper portion of the digester undergoing filling, and utilizing said hot acid liquor for packing fibrous material in the last mentioned digester while the latter is being filled.

In testimony whereof, I have signed this specification.

THOMAS LEONIDAS DUNBAR.