

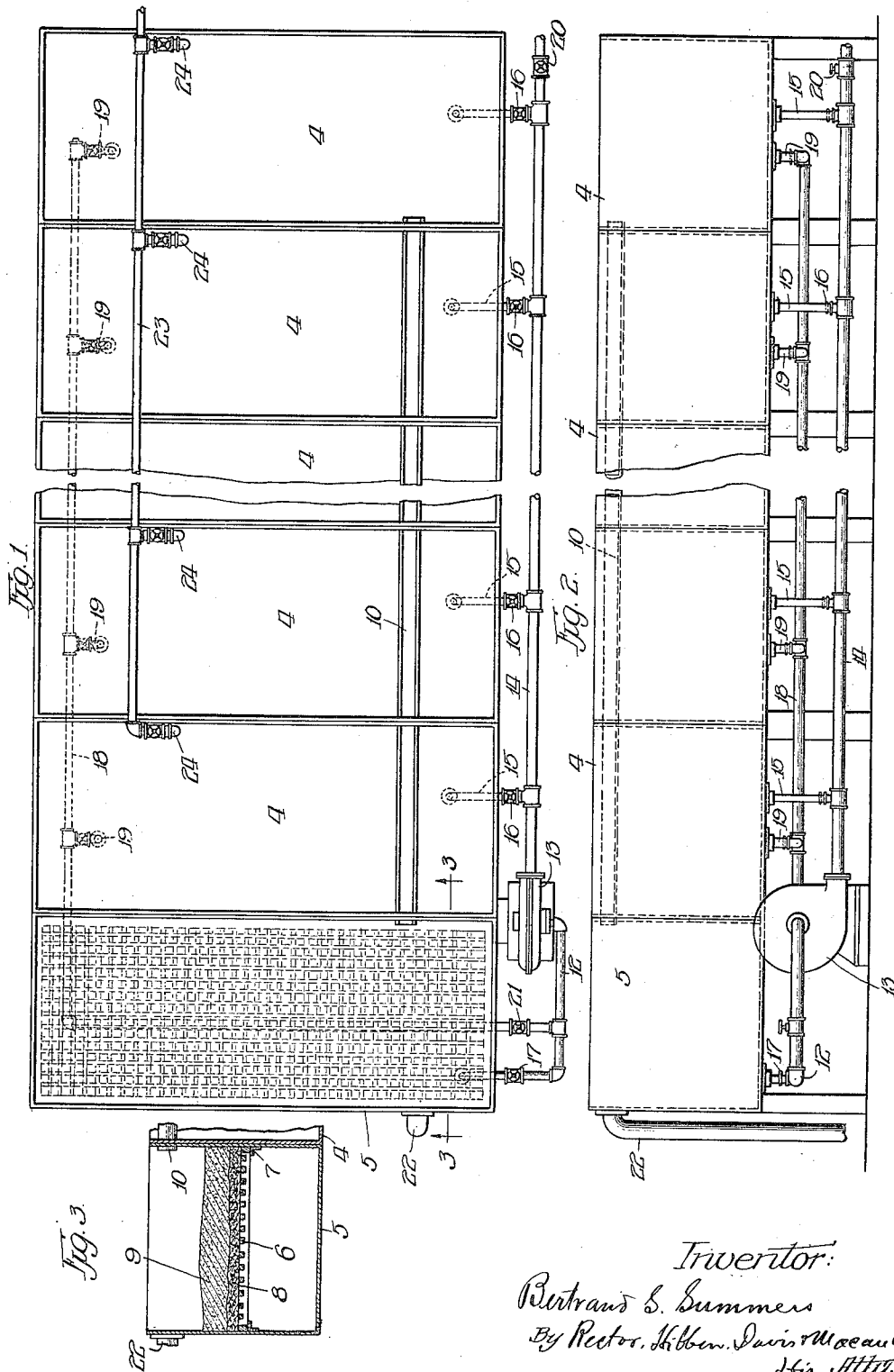
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ART OF RETTING FLAX

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UNITED STATES PATENT OFFICE.

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ART OF RETTING FLAX.

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To all whom it may concern:

Be it known that I, BERTRAND S. SUMMERS, a citizen of the United States, residing at Port Huron, in the county of St. Clair and State of Michigan, have invented certain new and useful Improvements in the Art of Retting Flax, of which the following is a specification.

My invention relates to a process of retting flax and particularly to that form of retting known as tank retting which operation is carried out within doors, and the object of my invention is to so conduct the retting process as to produce the highest spinning qualities and to preserve the total strength factor inherent in the straw.

As is well known in this art, retting is caused by bacterial action. I have observed that during the retting process a putrefying effect occurs and I have discovered that this putrefying effect has a deleterious action upon the fiber causing a weakening of the fiber and disintegration of the filament. It has been generally supposed in the art that the successful carrying on of the retting process is dependent upon the conditions and time element. I have discovered that the retting process is dependent for its success upon the activity of certain beneficial bacteria and it is hindered by the activity of putrefaction bacteria which are produced as a result of or connected with the action of the beneficial bacteria.

By my invention, therefore, I provide for neutralizing the action of the putrefaction bacteria while permitting and promoting the action of the beneficial bacteria.

In order to accomplish this, I provide a retting tank or tanks with means for continuously or intermittently removing the liquor therein contained. This liquor carries with it both putrefaction and beneficial bacteria, and I treat the liquor removed from the tank in such a way as to neutralize the action of the putrefaction bacteria, and then return the liquor so neutralized but retaining the activity of the beneficial bacteria to the tank or tanks.

The invention may be practiced in a number of ways and by a great variety of apparatus. In the accompanying drawings I disclose one form of apparatus which may be employed in carrying out my practice. It being understood that this disclosure is for the purpose of exemplification only.

Referring now to the drawing, Fig. 1 is a plan of an installation for practicing my invention; Fig. 2 is a side elevation thereof, and Fig. 3 is a vertical longitudinal section of a portion of the device on the line 3—3 of Fig. 1.

The installation comprises a suitable or desired number of retting tanks 4 which may be of unusual or approved construction and are adapted to contain each a desired quantity of straw to be retted. At one end of the series of retting vats is a filter 5 which in general construction may be similar to the retting vats and is adapted and designed to remove the insoluble products of the retting fermentation by circulating the liquids from the retting vats through said filter. This filter should be of sufficient size to accommodate considerable supplies of old liquor so that as new vats are made up, this supply may be drawn upon to make a liquor for the new vats, or if desired, an odd storage tank may be supplied, or one of the battery of retting vats used for the storage of retting liquor. In the particular form of filter shown a grid 6 is supported in the filter tank 7 a suitable distance above the floor thereof and is covered with a layer 8 of several inches of excelsior which forms a support for a bed of filter sand 9, as seen in Fig. 3. This form of filter answers the purpose satisfactorily though other forms may be employed if desired.

The retting liquor from the several tanks is conveyed to the filter by an overflow trough 10 communicating with each of the vats, and the filtered liquor is returned from the bottom of the filter to the respective vats by means of a pipe 12 leading from the bottom of the filter pump 13 to the inlet of which said pipe is connected, and a manifold 14 provided with branches 15 leading to the respective retting vats. Valves 16 control the branches, and a valve 17 controls the connection of the filter to the inlet of the pump. The pump is constantly operating during the normal retting operation, drawing the liquor from the bottom of the filter and discharging it into the bottom of the respective vats in which it rises through the flax straw within the vats and returns through the overflow conduit to the top of the filter. The liquor carries the insolubles from the retting action with it to the filter

where they are separated by the sand et cetera. The inlet of the pump is also connected by a manifold 18 and branch pipes 19 to the bottoms of the respective tanks, and discharge manifold 14 has a valve controlled waste outlet 20 whereby when desired any or all of the tanks may be emptied through the pump. Normally however the branch pipes 17 are closed by the valves 21. The filter is provided with an overflow 22, and a pipe 23 connected to a suitable source of water supplies the retting vats with additional water when desired through the valve controlled branches 24. The temperature of the retting vats may be maintained by any desired means or by the temperature of the compartment or building in which the vats are installed, and therefore, I have not deemed it necessary to show any particular form of heating means.

Having now described a form of apparatus which may be used for carrying on the process the operation is as follows:

The straw is placed in the vats, covered with water and allowed to remain to proper temperature until bacterial action is evidenced. This is shown by the evolution of gas as a byproduct of bacterial action.

I now begin the circulation of the retting liquor drawing off the liquor from the top to skim off the scum which may have formed and convey the liquor to the filter which filters out the scum, the bacteria passing through the filter with the liquor. One result of the operation so far described is that by removing the scum of the insoluble by-products from the liquor a large part of the culture for the putrefying bacteria is removed. In order to still further neutralize the action of these bacteria I dilute the liquid prior to returning it to the vat.

I discovered that the quality of the ret is produced by maintaining the bacterial density of the beneficial bacteria at a maximum while maintaining the density of the putrefying bacteria at a minimum, and I have found that if the liquor is permitted to become too highly concentrated deleterious effects are produced, and that if the liquor is too highly diluted a lower quality of ret results.

In practicing my invention, I have standardized the liquor so that relative proportions of the old and new liquors may be treated.

For this purpose I titrate a sample of the liquor, after it passes the filter with a suitable standardized solution of permanganate of potash, which in oxidizing the organic matter of the liquor loses its color. By noting the oxidizing action of this standard solution of permanganate of potash on the measured quantity of the retting liquor, I am able to determine the proper proportion of water to be added to the bath to render

the liquor suitable to the flax under the retting operation. I find that a relatively large quantity of the old liquor neutralized in respect to the action of the putrefaction bacteria may be employed.

In practice the standardizing of this retting liquor is carried out as follows:

A standard solution of permanganate of potash is usually made, using from $\frac{1}{4}$ gram to 1 gram of the salt to one liter of distilled water. When the standard is once made, the solution is always made up to this density. Fifty cc. of retting liquor is usually taken and this sample titrated with this standard permanganate solution. For a particular retting plant it is easily determined what density of organic matter as measured by this standard solution gives the best results in practice. When the limits of practical variation in this organic density has been once determined, it simply is necessary to make a test once in 24 hours and add sufficient fresh water to bring the organic density to a degree coming within these limits.

Generally speaking therefore my invention proceeds upon the idea of first removing from the retting liquor the insoluble by-products which favor the propagation of putrefying bacteria and further so diluting the soluble byproducts which favor this propagation as to substantially neutralize the action of these putrefying bacteria. A further function of the filter is to act as a bacterial cage which collects the bacteria and introduces them into the liquor passing through the filter, at the same time greatly decreasing the cultural medium for the putrefying bacteria. Further dilution of the liquor after passing the filter by means of a standardized solution further removes the cultural medium for the putrefying bacteria while the flax and straw in the vat continually act as a cultural medium for the beneficial bacteria.

It results from this operation that I obtain a retting liquor having the desired quantity of beneficial bacteria while the deleterious bacteria are constantly reduced to a minimum. The practical result of this is to obtain the maximum result the flax is capable of producing while the bacterial density of the beneficial bacteria produces a high quality in the resulting fiber, and the time element is considerably shortened.

I have described the operation above as it applies to a single vat. In employing a plurality of vats the retting liquor is continually circulated through the vats and filter as described, being led off from the upper level of the vats with the contained insoluble matter into the upper part of the filter tank whence it flows down through the filtering material and is returned by the pump to the bottoms of the respective

vats, the flow being regulated by the hand valves as heretofore described. If it is desired to empty the filter or any or all of the vats, this may be done by opening and closing proper valves. If a vat is to be drained, for example, if valve 21 is opened, and valve 17 controlling the connection of the pump to the filter is closed, the liquor thus drawn from the vat to be emptied may be discharged by means of the pump into the circulating system and through the other vats by means of the overflow to the filter or to the storage tank, or the valve 16 may be closed, and the valve 20 opened, the liquor discharging to the sewer.

To replenish the filter new sand or gravel or like material may be supplied or the old material may be removed from the filter, dried and agitated, in any suitable device, such as a tumbling barrel or cement mixer, and then properly screened, when the material is suitable to be used again in the filter. The screenings have good value as a fertilizing agent, having sufficient content of potash and nitrogen.

Having now described my invention what I claim and desire to secure by Letters Patent is:

1. The herein described process which

consists in withdrawing from a vat containing material being retted, liquor carrying beneficial and putrefaction bacteria, neutralizing the action of the putrefaction bacteria and returning the liquor so neutralized to the vat.

2. The herein described process which consists in subjecting the material to be retted to the action of bacteria contained in a neutralized, standardized liquor, substantially as described.

3. The herein described process which consists in withdrawing liquor from a vat containing material to be retted and inoculating such liquor with bacteria useful to the retting process by passing through a filter bed containing such useful bacteria.

4. The herein described process which consists in subjecting flax or the like in water to the action of useful bacteria, removing the liquor containing this bacteria together with putrefaction bacteria formed during the retting process, neutralizing the putrefaction bacteria contained in the liquor so removed but without destroying the useful bacteria, and then subjecting flax or the like to the action of the liquor so treated.

BERTRAND S. SUMMERS.