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PROCESS OF MANUFACTURING FIBER PULP.

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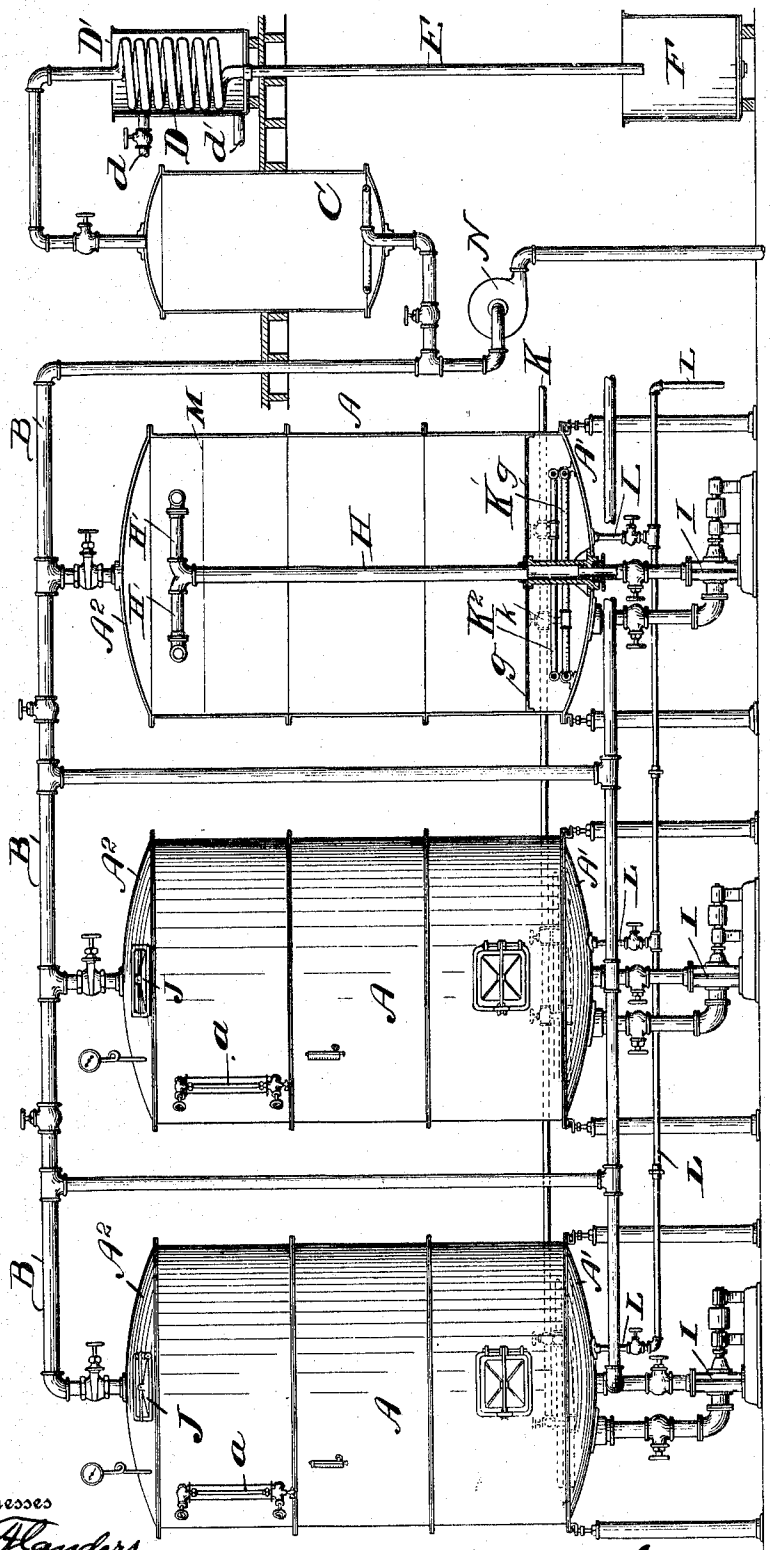
981,042. Patented Jan. 10, 1911.



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PROCESS OF MANUFACTURING FIBER PULP.

981,042. Specification of Letters Patent. Patented Jan. 10, 1911.

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To all whom it may concern:

Be it known that I, CONRAD L. WEIBERG, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Processes of Manufacturing Fiber Pulp, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to a process of manufacturing fiber pulp from wood chips and the like, which have been previously subjected to a chemical solution to remove the turp oil and other resinous products, as will be hereinafter more fully set forth and particularly pointed out in the claims.

The process may be stated briefly as consisting in subjecting the materials to the action of a chemical solution and provide for the continuous circulation of the solution through the mass of material, boiling the mass, during the process withdrawing the steam, vapors, or moisture, permitting the fiber and solution to settle, washing the chemical solution from the fiber and finally drawing off the fiber emulsion. By fiber emulsion I have reference to a soft fuzzy or woolly substance emanating from the wood which is in reality the pulp in its first stage.

Referring now to the reference characters displayed upon the drawing: A designates a suitable casing or boiler shell, preferably cylindrical in form, and having a concaved bottom A′. The top A^2 of the shell is conical, and leading therefrom is a pipe B which carries off the products of distillation, etc., said pipe being connected with the distilling apparatus C and coil or worm D commonly employed in distilling apparatus as a cooler and which is located in the water tank D′ through which a flow of water may be maintained by means of the inlet and outlet pipes *d*, *d*. The lower end of said coil or worm communicates through the downwardly extending pipe E to the receiving tank F.

Crossing the interior of the shell or extractor above the concaved bottom A′ thereof, is a perforated horizontal partition G which separates the interior of the extractor into two compartments, one above the other, these compartments however, communicate through the perforations *g* in said partition.

Standing vertically within the extractor is a standpipe H provided at its upper end with laterally extending branches or spray pipes H′;—its lower end being connected with the pump I, or said pipe H may be located on the outside and connect with the spray pipes H′.

In the top of the apparatus is a manhole J adapted to be closed by a manhole cover. By removing said cover the material to be treated may be introduced into the apparatus. A steam supply pipe K leading from a source of steam supply, (not shown), communicates with the bottom portion of the apparatus for direct steam heating and is also connected with a heating coil K′ for the purpose of boiling the contents of the extractor or to heat it to the desired temperature. The flow of steam through the pipe K to the coil K′ is regulated by the valve *k*. Leading from the bottom of the apparatus is a valve controlled discharge pipe L through which the contents of the extractor may be drawn off when desired.

The process of extracting spirits of turpentine and manufacturing wood pulp from resinous wood through the medium of my improved process and in accordance with my improved method is as follows:—Place in a still of any suitable capacity, chips of resinous wood cut from stumps, sawmill waste, etc., or from resinous, evergreen timber or other soft woods. Introduce to said charge of wood chips, sawdust or refuse, a solution, bicarbonate or carbonate of soda Na^2Co^3 spc. gw. 1.0746,—use more or less according to the percentage of rosin contained in the wood, charging the apparatus with the proper proportions so as to cover the wood with the solution to about the level indicated at M which may be determined by the gage glass *a*. Steam is then introduced into the coil K^2 to heat the contents in the extractor. The pump I is now started forcing the liquid or solution below the partition G upwardly through the standpipe H where it is discharged through the branch or spray pipes H′ onto the top of the mass within the apparatus. The action of repumping is continued causing a constant rotation and flow of liquid through the mass, causing a quicker contact and chemical reaction with the wood resting upon the partition G, whereby said

mass is permeated by said liquid and the turpentine, oils, rosin, gum, etc., is extracted from the cells of the wood. The action induced by the flow of the solution through the mass, together with the degree of heat employed, will cause the chemical to permeate the cells of the wood, effecting a saponification of the resin without destroying its properties, resulting in the complete extraction of the rosin from the wood, leaving the mass of chips free from impurities and gum.

When the turpentine is all distilled off and removed from the resinous solution, turn off the direct steam and introduce dry steam into the circulating coils K′ or steam jacketed still in which said wood material is charged. Next boil down the resinous solution withdrawing all steam vapors and moisture by a vacuum or suction pump N to bring the solution to a specific gravity of about 1.1423. By this time all the rosin will be extracted from the wood, then shut off steam and run off the resinous solution from the said wood contents treated in the charge, to suitable tanks. Said resinous product may then be re-treated for the solid rosin of commerce by a special treatment, which, however, forms no part of this process. After withdrawal of said resinous product, we have left the wood product, free from rosin and turp oils and other impurities;—it is now ready to be made into fiber pulp. Again fill the still with an added solution of potassium hydrosulfid and with a natrium-hydrosulfid NaHS using more or less proportion of the solution according to the class of wood to be treated, or I may use calcium sulfid treatment in case of exceedingly hard resinous wood such as Norway pine, long leaf yellow pine, and other hard timber. The charged contents are then boiled with dry steam at 5 to 10 pounds atmospheric pressure. The pump is then started pumping the heated solution from the bottom and discharging it evenly over the mass within the still (which prevents foaming) and continuing the rotation of the solution through the mass until the charge of wood is turned into emulsion;—fiber pulp. While the wood is being thus treated the vapors and moisture are withdrawn from the still by means of the vacuum or suction pump N. The pressure in still should be regulated until it will not be under 5 or over 10 pounds pressure, otherwise the fiber will become short, lose its strength, and be dark in color.

The circulation and continuous motion of the pumping causes the solution to be continuously brought into contact with the wood, the effect of which is to greatly reduce the time of maceration and the production of the fiber pulp, thus resulting in a longer and stronger fiber than is obtained by any other known process, being lighter in color, while the time required for production is greatly reduced. The steam is now shut off from the still, and the emulsion fiber and solution allowed to settle, the solution is then drawn off for recovery through pipe L into suitable tanks;—whereby more than one-half of the original charge is saved and more than one-half the usual cost of chemicals are recovered,—leaving the fiber pulp in the still for further washing. Water is now introduced in the still and all the sulfid remaining in the pulp washed out;—this is also saved. The fiber emulsion is then drawn off into holders for the beaters for further treatment and for manufacture into fiber board which will be found of superior quality and color.

Having thus described my invention, what I claim is:—

1. The process of making fiber pulp from wood chips, and the like which have previously been treated to remove the turp oil and other resinous products therefrom consisting in subjecting the mass to the action of a chemical solution without breaking up and destroying the life of the fiber, causing the said solution to pass through the mass out of contact therewith to maintain the heated condition of the solution and the temperature of the mass and subsequently spraying the same solution upon the mass for circulation directly through the mass and thus continuously circulating the same solution through the mass at times out of contact therewith and at times in contact therewith, boiling the mass, withdrawing the steam vapors or moisture, permitting the fiber and solution to settle, removing all chemical solutions from the fiber, and then drawing off the fiber emulsion.

2. The process of making fiber pulp from wood chips and the like which have previously been treated to remove the turp oil and other resinous products therefrom, consisting in subjecting the mass to the action of a chemical solution, causing said solution to be passed through the mass out of contact therewith, to maintain the heated condition of the solution and the temperature of the mass, subsequently spraying the solution that has circulated through the mass out of contact therewith upon the mass for passage therethrough, subjecting the mass during the circulation of the chemical solution to dry steam at a certain temperature to boil the mass, withdrawing the steam vapors or moisture, permitting the fiber and solution to settle, removing all of the remaining chemical solutions from the fiber, and then drawing off the fiber emulsion.

3. The process of making fiber pulp from wood chips or the like which have been treated to remove turp oils and resinous products therefrom, consisting in subjecting the mass to a chemical solution having the

same reaction as kali-sulfhydrate KHS, 1.1165 S. G. and natrium-hydrosulfid NaHS, boiling the charge, causing said solution to circulate continuously through said mass until complete maceration of the wood tissues is effected, withdrawing the vapors and moisture, permitting the emulsion and solution to settle, removing all remaining chemical solution from the emulsion, and then withdrawing the emulsion.

4. The process of making fiber pulp from wood chips or the like which have been treated to remove turp oils and resinous products therefrom, consisting in subjecting the mass to a chemical solution consisting of kali-sulfhydrate KHS, 1.1165 S. G. and natrium-hydrosulfid NaHS, boiling the charge, causing said solution to circulate continuously through said mass until complete maceration of the wood tissues is effected, withdrawing the vapors and moisture, permitting the emulsion and solution to settle, removing all remaining chemical solution from the emulsion, and then withdrawing the emulsion.

5. The process of making fiber pulp from wood chips or the like which have been treated to remove turp oils and resinous products therefrom, consisting in subjecting the mass to a chemical solution having the same reaction as natrium-hydrosulfid NaHS, boiling the charge, causing said solution to circulate continuously through said mass until complete maceration of the wood tissues is effected, withdrawing the vapors and moisture, permitting the emulsion and solution to settle, removing all remaining chemical solution from the emulsion, and then withdrawing the emulsion.

6. The process of making fiber pulp from wood chips or the like which have been treated to remove turp oils and resinous products therefrom, consisting in subjecting the mass to a chemical solution consisting of natrium-hydrosulfid NaHS, boiling the charge, causing said solution to circulate continuously through said mass until complete maceration of the wood tissues is effected, withdrawing the vapors and moisture, permitting the emulsion and solution to settle, removing all remaining chemical solution from the emulsion, and then withdrawing the emulsion.

7. The process of making fiber pulp from wood chips and the like which have previously been treated to remove the turp oil and other resinous products therefrom, consisting in subjecting the mass to the action of the same chemical solution which is circulated continuously in substantially a rotary course through the mass and during a part of its circulation not contacting with the fiber and during its remaining cycle of circulation passing directly through the fiber in contact with it, boiling the mass, permitting the fiber and solution to settle, removing all chemical solutions from the fiber, and then drawing off the fiber solution.

8. The process of making fiber pulp from wood chips and the like which have previously been treated to remove the turp oil and other resinous products therefrom, consisting in subjecting the mass to the action of the same chemical solution which is circulated continuously in substantially a rotary course through the mass and during a part of its circulation not contacting with the fiber and during the remaining cycle of circulation passing directly through the fiber in contact with it, subjecting the mass during such circulation of the solution to dry steam at a certain temperature to boil the mass, withdrawing the steam vapors or moisture, permitting the fiber and solution to settle, removing all of the remaining chemical solutions from the fiber, and then drawing off the fiber emulsion.

In testimony whereof, I sign this specification in the presence of two witnesses.

CONRAD L. WEIBERG.

Witnesses:
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