

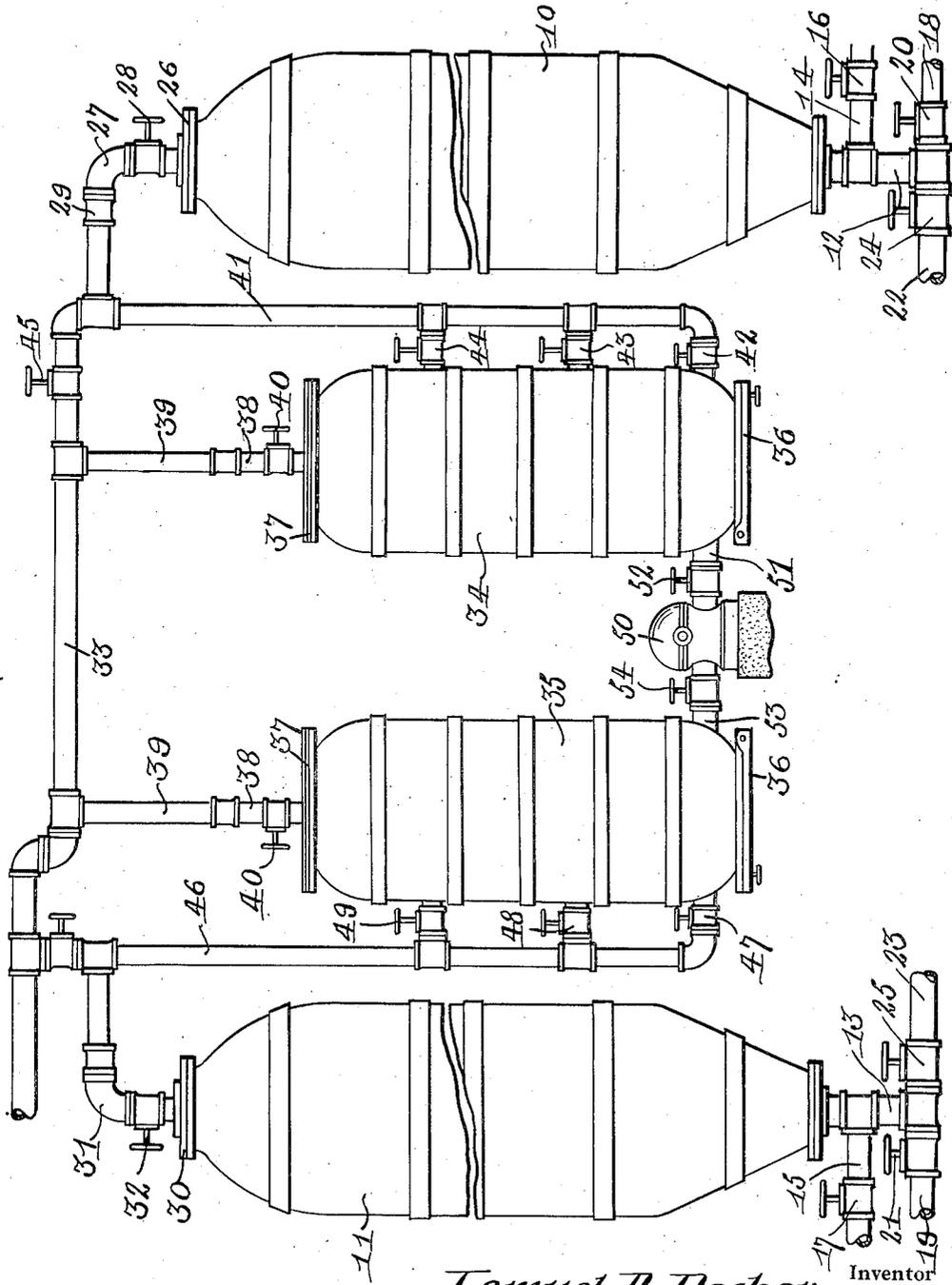
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PROCESS AND APPARATUS IN MANUFACTURE OF WOOD PULP

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PROCESS AND APPARATUS IN MANUFACTURE OF WOOD PULP

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5 The present invention relates to the manufacture of wood pulp and has particular reference to a process and apparatus for treating wood blocks in the manufacture of mechanical pulp in association with the digesters employed in the manufacture of sulphite pulp.

10 An important object of the invention is the utilization of the overflow or exhaust acid and vapors from chip digesters in a preliminary treatment of the wood blocks or logs to be subsequently ground for the production of mechanical pulp.

15 A further object of the invention is the provision of a process and apparatus for subjecting the wood blocks or logs to a preliminary cooking treatment for the production of a mechanical pulp of a light color suitable for news print paper with or without admixture of sulphite pulp.

20 Another object of the invention is the provision of a process and apparatus of the above character which will produce a mechanical pulp of superior qualities.

25 Still another object of the invention is the provision of a process and apparatus which will result in a substantial economy in the manufacture of pulp for news print paper and the like.

30 Other objects and advantages of the invention will become apparent as the description progresses.

35 In the accompanying drawing forming a part of this specification and in which like reference characters are employed to designate corresponding parts throughout the same;

40 The figure diagrammatically illustrates an apparatus suitable for carrying out the invention.

45 With particular reference to the drawing, wherein is shown a preferred embodiment of the apparatus, the numerals 10 and 11 designate a pair of digesters commonly employed for the cooking treatment of wood chips, usually called sulphite digesters in view of the customary use of a sulphite acid solution for the production of a sulphite pulp.

50 To the lower ends of the respective di-

gesters 10 and 11 are connected pipes 12 and 13 each having a branch pipe 14 and 15 connected with the intermediate portion thereof and controlled by the respective valves 16 and 17 for the introduction of acid solution into the digesters. To the lower ends of the pipes 12 and 13 are connected branch pipes 18 and 19 for the admission of steam to the chip digesters and having mounted therein control valves 20 and 21. To the opposed end portions of the pipes 12 and 13 are connected additional branches 22 and 23 having fitted therein control valves 24 and 25, respectively, for the discharge or blow-off from the respective digesters.

60 On the top of the digester 10 is removably fitted a cover 26 having connected to the center thereof an angular pipe section 27 in which is mounted a control valve 28. The cover and pipe section 27 may be removed as a unit with respect to a coupling section 29 for convenient charging of the digester with chips. A similar cover plate 30 is mounted on the digester 11 having connected thereto a pipe section 31 carrying a control valve 32. The angular sections 27 and 31 make connection with a longitudinal exhaust pipe, generally indicated at 33, disposed to conduct the gases exhausted from the digesters and the overflow acid solution to an acid storage tank not shown.

70 Arranged vertically between the chip digesters 10 and 11 are a pair of wood block cooking receptacles or digesters 34 and 35 designed to receive therein a charge of wood logs or blocks cut in suitable sizes for grinding. To the lower end of each of the block digesters 34 and 35 is hingedly connected a closure plate 36 normally secured in a horizontal closing position by means of a rotatable latch member and operable to a downwardly swinging block discharging arrangement.

75 On the top of each of the digesters 34 and 35 is detachably secured a removable cover 37 having connected therewith a relatively short pipe section 38 which may be removed with the cover to fill the digesters with blocks. The pipe sections 38 are normally 80 85 90 95 100

connected with vertically extending pipes 39 connected at spaced positions with the main exhaust conduit 33. A control valve 40 is operatively mounted in association with

5 each of the upwardly extending sections 38. Extending vertically between the chip digester 10 and the block digester 34 is a connecting pipe 41 having its upper end connected with the exhaust header 33 and its lower end connected with the lower portion of the block digester by a transverse branch having mounted therein a control valve 42. An intermediate branch connects the pipe 41 with the intermediate portion of the digester 34 and is controlled by a valve 43. An upper branch also connects the pipe 41 with the upper portion of the digester 34 and carries a valve 44. A stop valve 45 is mounted in the exhaust header 33 between the connection of the pipes 39 and 41 there- with. A similar vertically extending pipe 46 extends from the exhaust line 33 to the bottom portion of the digester 35, the lower branch connection having mounted therein a control valve 47, an intermediate branch connection being controlled by a valve 48 and an upper branch carrying a valve 49.

20 Between the block digesters 34 and 35 is positioned a force pump, conventionally illustrated at 50, preferably of the reversible type, having connection with the digester 34 through a pipe line 51 in which is mounted a valve 52 and similarly connected with the digester 35 through a pipe line 53 in which is mounted a valve 54.

The construction described in the foregoing illustrates a typical battery connection of chip and block digesters, the number of which may be varied in accordance with the working capacity of the mill in which the apparatus is installed.

The process may be carried out by initially filling the chip digester 10 with the wood chips by the removal of the head plate 26 and pipe section 27 connected therewith. After the digester is filled, the head is replaced and bolted tightly in position thereon. The chemical solution, preferably embodying a sulphite acid solution including sulphurous acid, a portion of which is combined with a metallic element, is forced into the digester 10 through the branch pipe line 14 by opening the valve 16 and closing the valves in the steam and discharge conduits 18 and 22. Steam is subsequently admitted into the digester by opening the valve 20 in the steam line 18 and closing the valves 16 and 24.

60 When the action of the steam has raised the temperature and pressure in the digester to a suitable predetermined degree, this temperature is maintained relatively uniform by opening the escape or relief valve 28 so as to permit the relief or escape of excess gases

and overflow acid solution. During the introduction of the steam into the chip digester 10, the adjacent block digester 34 is filled with blocks by removing the head plate 37, the blocks being in the form commonly cut for the grinding machines. During the cooking operation in the chip digester 10, the valve 45 in the discharge line 33 is closed, the valve 42 in the lower branch line of the connecting pipe 41 is fully opened while the auxiliary elevated branch control valves 43 and 44 are partly opened so that the escape acid and gases from the chip digester are conducted into the adjacent block digester 34.

When the temperature of the acid in the block digester 34 attains a suitable degree, somewhat lower than the temperature in the chip digester, the escape valve 40 is opened to allow the excess gases and acid to escape from the block digester 34 into the exhaust conduit 33. Thus, the wood blocks or logs in the digester 34 are cooked at a predetermined relatively uniform temperature.

This treatment of the wood blocks, that is, by cooking the same in the material exhausted or discharged from the sulphite chip digester, effectively softens the blocks so that upon subsequent grinding the mechanical pulp produced will be substantially stronger than the ground wood now procured and will have a desirable, relatively light color comparable to the sulphite pulp requiring a greatly reduced proportion of sulphite pulp in the manufacture of news print and similar paper.

During the simultaneous operation of the chip digester 10 and the block digester 34, the complementary chip digester 11 and block digester 35 are filled with chips and blocks respectively, in the manner indicated in the foregoing. When the initial operation is completed, the exhaust valves 28 and 40 and the control valves 42, 43 and 44 are closed. The blow valve 24 is opened and the contents of the chip digester 10 are blown into a suitable blow pit. The pump 50 is now actuated so as to pump the acid solution from the block digester 34 into the adjacent block digester 35 so as to subject the blocks in the latter to a preliminary heating treatment. The bottom plate 36 of the digester 34 is then swung to an open position so that the treated blocks are dropped into a suitable receiver.

The cooking operation is then repeated upon the opposed side of the battery, the acid solution being injected into the digester 11 and the steam subsequently admitted as previously described for the digester 10. During the operation of the digester 11, the exhausted gases and acid are conducted into the adjacent block digester 35 through the pipe line 46 and by opening the valves 47, 48 and 49.

As is well known to those familiar with this art, the cost of producing chemical or sulphite pulp is materially greater than that of mechanical pulp due to the treatment and the loss in the yield of the former. By utilizing the outlet gases and acid solution from the sulphite chip digester in subjecting the wood blocks of the mechanical pulp to a preliminary cooking treatment, the quality of the latter is increased to such an extent that the amount of sulphite pulp required in paper manufacture is greatly reduced and the ultimate cost of the pulp suitable for news print paper is substantially decreased.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same in that various modifications in the apparatus and steps of the process may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. The process of manufacturing wood pulp which consists in conducting the escaped chemical solution from a chip digester to a wood block digester so as to subject the wood blocks to a preliminary cooking treatment during the operation of the chip digester prior to grinding the wood blocks.

2. The process of manufacturing wood pulp which consists in piping a plurality of wood chip digesters and wood block digesters in battery, conducting the escaped chemical solution from a chip digester to a wood block digester to cook the wood blocks during the operation of the chip digester, transferring the heated acid from the wood block digester to an adjacent wood block digester to subject the wood blocks in the latter to a preliminary heating treatment, and cooking the wood blocks in the second wood block digester by conducting the chemical solution from the adjacent chip digester therein.

3. The process of manufacturing wood pulp which consists in utilizing the chemical solution exhausted from a sulphite chip digester during its cooking operation, to subject wood blocks in an adjacent wood block digester to a preliminary cooking operation prior to grinding the said wood blocks in the manufacture of mechanical pulp.

4. The process of manufacturing wood pulp which consists in conducting the chemical liquid and gases escaping from a chip digester during its operation to a wood block digester to subject the wood blocks in the latter to a preliminary cooking treatment prior to grinding the wood blocks.

5. In an apparatus of the character described, the combination of a plurality of

wood chip digesting vessels, a corresponding number of wood block digesting vessels, pipe lines connecting each of the chip digesting vessels with the block digesting vessels in complementary units, the said pipe lines being disposed so that the matter discharged from the chip digesting vessels during the cooking operation can be conducted into the block digesters, and means whereby the cooking liquid can be transferred from one block digester to another.

6. In the manufacture of wood pulp, the process which consists in conducting the relief matter discharged from a wood chip treating vessel to a wood block treating vessel to subject the blocks to a preliminary impregnation treatment in the latter.

7. In apparatus for treating wood in the manufacture of pulp, the combination of a plurality of batteries each consisting of a wood chip treating vessel and a wood block treating vessel, relief pipes connecting each of the vessels with an exhaust header, conduits arranged so that the relief matter of a chip treating vessel may be conducted to the block treating vessel connected in battery therewith, valvular means for controlling the discharge of relief matter into the block treating vessels, and a conduit directly connecting block treating vessels of the batteries.

In witness whereof I have hereunto set my hand.

LEMUEL B. DECKER.