United States Patent

[11] **3,607,620**

[72] Inventor **Lawrence A. Carlsmith**
Amherst, N.H.

[21] Appl. No. **794,023**
[22] Filed **Jan. 27, 1969**
[45] Patented **Sept. 21, 1971**
[73] Assignee **Improved Machinery Inc.**
Nashua, N.H.

[54] **BATCH DIGESTION WITH PREMIXED DIGESTION LIQUOR**
9 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **162/37,** 162/52, 162/61
[51] **Int. Cl.** **D21c**
[50] **Field of Search** 162/37, 38, 40, 52, 233, 241, 246, 242, 39, 61

[56] **References Cited**

UNITED STATES PATENTS

2,007,348	7/1935	Scharmann et al.	162/40 X
2,035,447	3/1936	Altick	162/242 X

Primary Examiner—Howard R. Caine
Attorneys—Carl R. Horten, David W. Tibbott and Robert R. Paquin

ABSTRACT: A batch digesting or pulping apparatus in which a reaction vessel is provided a premixed, reaction liquors mixture predetermined as suitable for the batch-pulping operation. The reaction vessel is connected to supply premixed liquors to a mixing vessel wherein the liquors are intermixed with wood chips; and the wood chips—liquors mixture is pumped to the reaction vessel whereby the chips are sluiced into the latter and the mixture displaces liquors from the reaction vessel. Also, a batch digesting or pulping method wherein a premixed, reaction liquors mixture is supplied to a reaction vessel, then discharged to a mixing vessel in which it is intermixed with wood chips, and the wood chips—liquors mixture is supplied to the reaction vessel to displace premixed liquors therefrom.

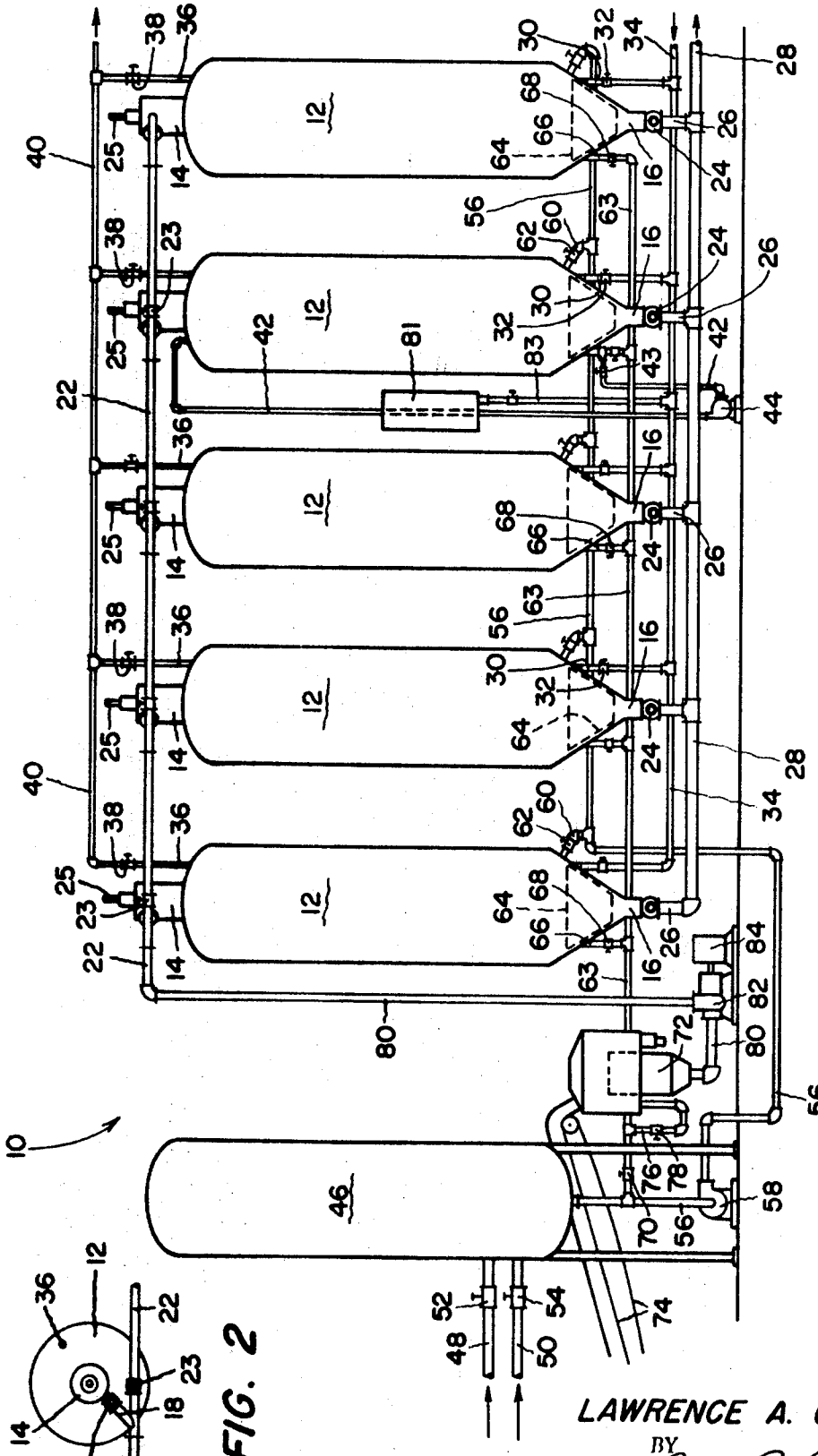


FIG. 1

FIG. 2

INVENTOR.
LAWRENCE A. CARLSMITH
BY
Robert L. Paquin
ATTORNEY

BATCH DIGESTION WITH PREMIXED DIGESTION LIQUOR

The present invention relates to batch digesting and more particularly to apparatus and methods particularly adapted for the batch digesting or pulping of wood chips.

Conventionally, in the batch digesting or pulping of wood chips the chips are generally gravity fed into the digester or reaction vessel from either a conveyor system or an overhead storage bin. When a reaction vessel is fed in this manner, however, the chips form into a conical pile which causes a major portion of the chips to lie in a shingled orientation when the reaction vessel is full. This shingled orientation of the chips causes channeling of the heat and reaction liquors during the heating and cooking portions of the batch-digesting process and results in nonuniform cooking of the chips and nonuniform pulp production. Undercooked portions of the chips result in a substantial quantity of reject chips which must be separated from the acceptable pulp and returned for repulping. Also, the variation in cooking of the chips necessitates that the degree of cooking be more severe than would be necessary with a uniform cook and in this manner reduces the yield of pulp obtained from the chips.

An object of the invention is to provide a new and improved batch-digesting method particularly adapted whereby a reaction vessel is fed in such a manner that the production of acceptable pulp is facilitated.

Another object is to provide a new and improved batch-digesting method which is particularly adapted for facilitating the control of the mixture of reaction liquors employed during the batch-digesting operation.

In general, these objects are attained by the provision of a batch digesting or pulping method comprising providing a premixed mixture of reaction liquors, supplying the premixed mixture of reaction liquors to a reaction vessel to substantially fill the reaction vessel with the premixed liquors, intermixing the premixed liquors with wood chips externally of the reaction vessel to form a wood chip-liquors mixture and supplying this latter mixture to the reaction vessel to cause displacement of premixed liquors therein while employing displaced premixed liquors to form the wood chips-liquors mixture, cooking the wood chip-liquors mixture in the reaction vessel in a batch cook, and discharging the cooked wood chip-liquors mixture from the reaction vessel. Referring to the drawings:

FIG. 1 schematically depicts a batch digesting or pulping apparatus constructed in accordance with the present invention; and

FIG. 2 is a top or plan view illustrating the inlet or upper end of one of the reaction vessels of the digesting apparatus.

Referring more particularly to the drawings wherein similar reference characters designate corresponding parts throughout, **10** generally designates a batch digesting or pulping apparatus comprising a plurality of generally vertical or upright, elongated reaction vessels **12** which are all of identical construction. The reaction vessels **12** are each provided with a relatively large diameter, chip inlet **14** adjacent the upper end and chip outlet **16** adjacent the lower end; and the chip inlets **14** are tangentially connected to individual supply pipes **18** each containing a shutoff valve **20**. The supply pipes **18**, in turn, are connected to a supply manifold conduit or pipe **22** which is provided with a plurality of shutoff valves **23** arranged such that, during the filling of a reaction vessel **12**, the portion of the manifold conduit **22** downstream (i.e., to the right in FIG. **1**) of such vessel **12** may be closed. The chip inlets **14** are provided with chip level probes **25** for sensing when the reaction vessels **12** are substantially filled with chips, such probes **25** being conventional expedients for permitting the vessels **12** to be substantially filled while avoiding the risk of overfilling and plugging.

The chip outlets **16** are individually provided with shutoff valves **24** which control discharge through the chip outlets **16** such that wood chips may be selectively retained in any one or more of the reaction vessels **12** for batch pulping. The chip outlets **16** in the conventional manner are connected through

individual discharge pipes **26** to a discharge manifold conduit or pipe **28** communicating with a conventional blow tank (not shown).

The lower ends of the reaction vessels **12** are connected through individual connecting pipes **30**, each containing a shutoff valve **32**, to a steam supply manifold conduit or pipe **34** which in the conventional manner communicates with a suitable steam source (not shown). The upper ends of the reaction vessels **12** each communicate through a relief pipe **36**, containing a shutoff valve **38**, with a turpentine extraction or relief manifold **40**. In addition, each of the reaction vessels **12** is provided with a circulating conduit **42** which communicates with the upper and lower ends of its respective reaction vessel **12**. Each of the conduits **42** is provided with a control valve **43** and has interposed therein a conventional circulating pump **44** operable to circulate reaction liquors from such respective reaction vessel **12** through the circulating conduit **42**. A heat exchanger **81**, supplied with steam from the manifold **34** by a conduit **83**, may be interposed in the conduit **42** for heating the circulated liquors, if desired. The conduits **42**, pumps **44**, and heat exchangers **81** are conventional expedients well known in the art and, hence, have been shown in the drawings as applied to only one of the reaction vessels **12** to facilitate the clarity of the drawings.

The apparatus **10** also comprises a liquor accumulator or tank **46** which is of a volume substantially that of a single reaction vessel **12**. The accumulator **46** is connected to receive white liquor through a white liquor supply conduit **48** and is also connected to receive black liquor through a black liquor supply conduit **50**. The liquor supply conduits **48**, **50** are provided with control valves **52**, **54**, respectively, which during the filling of the accumulator **46** are adjusted to cause the relative proportions of white liquor and black liquor supplied to the accumulator **46** to be such that, after the liquors intermix in the accumulator **46**, the accumulator **46** contains a mixture of the liquors predetermined as suitable for the batch-digesting operation to be undertaken. The accumulator **46** is connected to a liquor discharge conduit **56** which communicates with the lower end of each of the reaction vessels **12** through individual liquors supply conduits **60** each containing a shutoff valve **62**. A liquors supply pump **58** is interposed in the discharge conduit **56** for supplying the mixture of the liquors through such conduit to the liquors supply conduits **60**. A liquors return conduit **63** communicates with the lower end of each of the reaction vessels **12** through individual liquors return pipes **66**, each containing a shutoff valve **68**, and is connected to the discharge conduit **56** to supply liquors thereto under the control of a valve **70**. The liquors return pipes **66**, as will be noted, are connected to the reaction vessels **12** to receive liquors through the strainers **64** of such vessels **12**; and the before-described circulating conduits **42** communicate with the lower ends of the reaction vessels **12** through such strainers **64** and pipes **66**.

The apparatus **10** also includes a mixing vessel or tank **72** which is arranged to be selectively fed dry wood chips by a feed conveyor **74**. The mixing vessel **72** may, for example, be of the type disclosed in U.S. Pat. No. 3,154,295 issued Oct. 27, 1964, to Karl E. Vogel and assigned to the assignee of the present application. The mixing vessel **72** communicates with the liquors return conduit **63** through a branch conduit **76**, containing a control valve **78**, whereby, during the flow of the liquors through the return conduit **63**, a portion of such flow may be directed into the mixing vessel **72** for intermixture with wood chips therein. The mixing vessel **72** is connected by a feed conduit or pipe **80** to the supply manifold conduit **22**; and a feed pump **82** driven by a motor **84** is interposed in the feed conduit **80** for supplying a wood chip-liquors mixture from the mixing vessel **72** to the manifold **22**. The feed pump **82** may be of any suitable conventional construction capable of pumping the wood chip-liquors mixture through the feed conduit **80**, but preferably is a centrifugal pump.

In the operation of the aforedescribed apparatus **10**, the reaction vessels **12** are serially filled from the supply manifold

The whole was passed into an oven at 150° C., and kept there for 1–2 minutes. Thereafter, onto the previous layer a second layer (foamed) was spread, which consisted of:

PVC, paste making resin, having a K-value of 72	100 parts (by weight)
dioctyl phthalate	80 parts (by weight)
azodicarbonamide	2 parts (by weight)
dibasic lead phthalate (stabilizing kicker)	2 parts (by weight)
TiO_2	5 parts (by weight)
polypropylene flakes	5 parts (by weight)

The initial thickness of this layer was 200 microns.

The whole was then passed into an oven at 200° C. and kept there for 1–2 minutes. The release paper was then removed. The system was then subjected to a slight tension in order to facilitate the separation of those components that were incompatible with each other; then the system was coupled to a cotton jersey fabric (with the second layer adjacent to the fabric), after preliminarily having spread on the fabric some plastisol of the first layer which served as a binder. Said coupling occurred in about 1 minute in an oven heated to 150–170° C.

The poromeric material thus obtained showed the following air transpiration rates:

Pressure (mm. Hg)	cm.³ of air Hr. cm.²

The release paper was then removed and the system was subjected to a slight tension and subsequently was coupled to a jersey fabric made of polyamide fibers, the second layer being adjacent to the fabric after preliminary having spread on the fabric some plastisol of the first layer which serves as a binder.

The poromeric material thus obtained shows the following air transpiration rates:

Pressure (mm.Hg)	cm.³ of air hr. cm.²
20	2.0
40	80
60	121
100	205
150	270

Example 3

On a device for the preparation of artificial leather substrate of release paper was spread coated with a plastisol consisting of (layer 1, compact):

PVC, paste making resin with a K-value = 70	100 parts (by weight)

chip-liquors mixture and pumping this latter mixture to the reaction vessel to provide the batch to be pulped and cause displacement of premixed liquors therein while employing such displaced premixed liquors to form the wood chip-liquors mixture, cooking the wood chip-liquors mixture in the reaction vessel in a batch cook, and blowing the cooked wood chips-liquors mixture from the reaction vessel.

4. A method according to claim 3, wherein the aforegoing steps are cyclically repeated with respect to each of a plurality of reaction vessels.

5. A method according to claim 3, wherein said wood chip-liquors mixture is supplied to the reaction vessel by being sluiced in a downward direction into the reaction vessel, and the reaction vessel is supplied the wood chip-liquors mixture at a pressure less than that of the reaction vessel during the cooking of such mixture.

6. A batch-pulping method according to claim 1, wherein only a portion of the displaced premixed liquors is employed to form said wood chips-liquors mixture.

7. A batch-pulping method according to claim 6, wherein such employed portion of the displaced premixed liquors is substantially equal in volume to the volume of the liquors in the wood chips-liquors mixture causing the displacement.

8. A batch-pulping method according to claim 3, wherein only a portion of the displaced premixed liquors is employed to form said wood chips-liquors mixture, and the remainder of the displaced premixed liquors is utilized to form a portion of the liquors mixture for a succeeding repeat of the process.

9. A batch-pulping method according to claim 8, wherein said employed portion of the displaced premixed liquors is only a minor portion thereof.