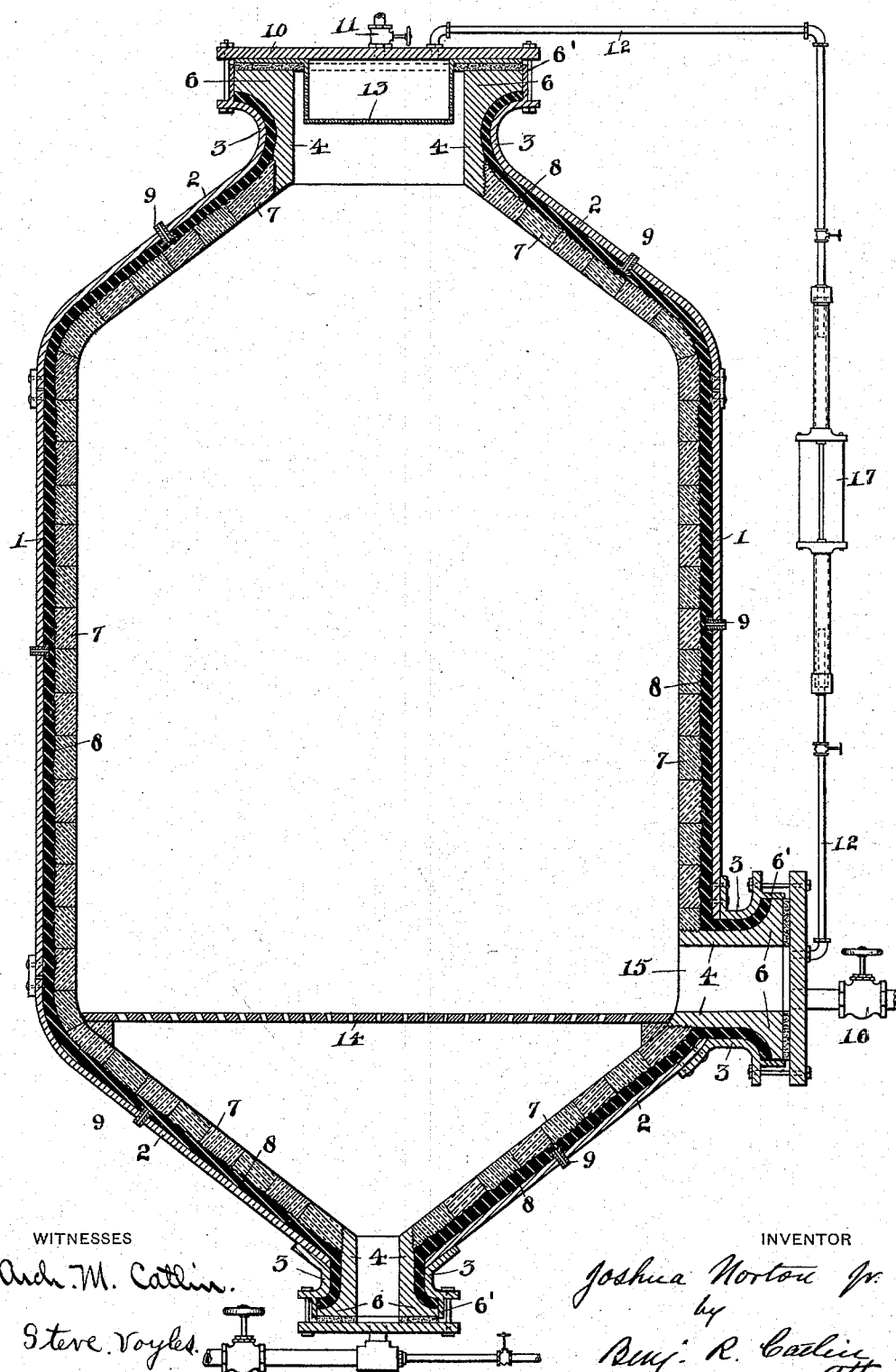


(No Model.)

J. NORTON, Jr.
SULFITE DIGESTER.

No. 527,876.

Patented Oct. 23, 1894.



UNITED STATES PATENT OFFICE.

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SULPHITE PULP COMPANY, OF BOSTON, MASSACHUSETTS.

SULFITE-DIGESTER.

SPECIFICATION forming part of Letters Patent No. 527,876, dated October 23, 1894.

Application filed June 29, 1891. Serial No. 397,880. (No model.)

To all whom it may concern:

Be it known that I, JOSHUA NORTON, Jr., a resident of Chatham, Province of New Brunswick, Canada, have invented certain new and useful Improvements in Sulphite-Digesters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

The invention relates to so-called sulphite digesters for paper pulp and has for its object to provide a digester having a tile lining with a molded cement backing, which lining shall be capable of withstanding the chemical and mechanical action of hot acids for a longer period than heretofore and to produce one having a minimum number of openings and provided with advantageous adjuncts; and the invention consists in the matters hereinafter described and particularly pointed out.

In the accompanying drawing, the figure is a vertical and approximately central section.

1 denotes a riveted cylindrical iron shell, and 2, 2 the top and bottom dome shaped ends, which may be either conical or hemispherical, as preferred. Each of these ends is preferably made of one piece welded and formed into shape without the usual rivets. To these are attached the bell shaped necks 3, each preferably welded to the dome 2, or they may be secured by rivets in any suitable manner; but in all cases the neck should be made of one piece by suitably welding and forming the same. The object of the bell shaped or enlarged neck 3 is to provide for interior necks or acid resisting linings 4 composed of vitrified pottery, or of cement composition being placed inside thereof. The bell shape affords a bed against which the lining will solidly rest, thus preventing movement of the said inner lining, when a cover 10 is bolted on. This form also allows of a larger body of material at the angle 6 of the neck lining where the greatest strain from the pressure of the cover occurs. This is of importance in connection with the use of frangible material such as described, and to further protect and hold the neck lining a hoop or ring 6' is provided. Without this hoop the lateral outwardly extended flange

of the inner neck is liable to be broken when the cover is bolted on. In case the lining be broken the hoop prevents the broken pieces from being blown out by internal pressure thereby obviating the loss of the "cook." The composition of which this neck is sometimes formed when in a plastic state can be molded against said hoop or ring. I do not intend to confine myself to the exact shape of the vitrified neck as it is equally applicable to digesters whose necks are not bell shaped.

The improvement as far as respects the neck and lining is entirely independent of the particular number of openings or necks employed in the digester.

My digester has also an acid resisting lining, and the method of applying it is as follows:—Commencing at the bottom, the vitrified neck 4 being less in diameter than the interior of the iron neck 3, is placed in position leaving a space of about one half inch between it and the iron. A composition of acid resisting cement is then poured into the space and allowed to set, thus combining the neck and cement and holding the inner neck solidly to the iron. The vitrified or composition necks are preferably made of one piece, but they may be made of two or more parts and fitted to one place. Tiles 7 either vitrified and unglazed, or made of a cement composition and thoroughly dried are fitted to the neck 4, and one course or tier is laid in acid resisting cement, in such manner as to leave a narrow or thin space preferably of about one inch between the tile and the iron shell forming a mold into which is poured a thin fluid composition of acid resisting cement 8. The laying of the tiles and pouring in of the cement is continued in this manner until the digester is entirely lined with combined tiles or blocks of cement and molded cement.

A composition of hydraulic cement, asbestos, sulphate of baryta, and silicate of soda is suitable for a neck or a lining, and a neck or tile made of an acid resisting composition of such character and having no glaze is the equivalent of a vitrified neck or tile in my construction. The use of an alkaline silicate in the composition is recommended as it increases the acid resisting power of the cement when combined with other ingredients there-

of. The semi-fluid cement being poured between the shell and the tile previously cemented together, fills every superficial opening in the tile and between their inner edges
5 and sets before its moisture is too much absorbed and is united with the tile in a very intimate and solid manner.

I prefer for the neck and for the lining or backing a composition of hydraulic cement
10 and an alkaline silicate such as silicate of soda with or without other ingredients but the particular composition is not of the gist of the invention.

To obviate the breaking of the cement, the
15 following described device is employed:— Molded cement has a tendency to draw or contract toward and from one or two points, or from a few points while setting, thus causing a movement of a large body of the cement
20 in two or more directions and producing cracks. Slight movement of sections not more than one or two feet across do not cause cracking. I therefore preferably insert into the iron shell at short intervals anchor bolts,
25 as at 9. These bolts being bedded into the molded cement hold it in place and effectually prevent the cracking. They can be provided with a groove or a hole through their center, thus making a vent by which a leak
30 can be located. The tile may also be scored on the side next the cement to assist in uniting and holding the cement.

In the drawing 10 is the cover or man hole plate of the top of the digester, preferably
35 made of bronze but it may be made of iron and coated with lead. To this cover is attached the gas escape valve 11, and also the steam end of the water gage pipe 12. To protect these from chips which pass into them
40 when the digester is in use I provide a basket of perforated bronze or lead, 13, which is attached to the cover 10. By attaching the basket to the cover I avoid the trouble occasioned by the commonly used lead sheet laid
45 loosely on a ring or shelf in the neck of the digester, which sheet rises up and allows chips to pass out around it. The basket has a transverse diameter less than that of the neck so that fluids may pass between the said
50 basket and neck whereby they have a more extensive and freer outlet. This construction also avoids the use of a packing between the basket and cover.

It has been usual to discharge the cooked
55 pulp by blowing off through a valve at the bottom, or at the side near the bottom of the digester. In the process of cooking a sediment of lime is precipitated to the lower part of the digester and becomes mixed with the
60 chips preventing the thorough cooking of all chips so mixed with lime. In blowing off at the bottom this and the uncooked wood pass out with the rest and damage the entire charge. To obviate this I provide a perforated bottom 14 at about the top of the bottom cone, through which bottom the lime
65 passes into the space below not occupied by

chips. On a level with the top of this perforated bottom in the side of the digester, I provide an opening or door 15. In the cover
70 of this opening is a blow off valve 16 and the water end of the water gage pipe. The opening heretofore occupied by the blow-off valve corresponds in size and function to such pipe opening in the cover in the present construction and such opening is entirely
75 inoperative for the purposes of my improvement which requires one of such size and location that a stream of water can be thrown therethrough by a hose or otherwise without
80 materially interfering with the outflow of such water mingled with the solid material dislodged thereby. The cover of my opening is made readily removable and it is only
85 brought into use after the ordinary blow-off pipe has done its work in the removal of the fluid or semi-fluid contents of the digester. The quantity of acid varies with different kinds of wood. To assist in ascertaining
90 when the desired quantity is admitted to the digester, I provide a water gage 17, which to suit different cases is made adjustable in length by telescoping the pipes that form it. Such construction is shown in the drawing,
95 the ends of the inner pipes being indicated by dotted lines. The joints between the inner and outer pipes are packed water-tight in any usual manner. The opposite ends of the inner pipes are extended to and joined with the covers as shown. They may be detachably connected to the said covers or may have detachable joints of usual character in the pipes themselves at points near the covers.

The bottom of the digester is provided with an opening and a cover for the same to which
105 is attached a wash out valve and a steam valve. In discharging the contents of the digester, the valve is opened to blow out all that will pass. The cover is then removed and a stream of water introduced to wash out any
110 remaining wood. This can be easily and thoroughly effected as the opening is practically on a level with the perforated floor or bottom 14. By this method the cooling off of the entire digester is obviated to the great saving
115 of time and heat. The latter which remains in the thick lining has been found to nearly equal the amount required to warm up the succeeding charge. The time heretofore required to cool off the digester so that a man can enter is from two to four hours. By my method
120 the washing out is done from the outside, and consequently this time is saved. By placing a trough at the discharge hole the pulp can be carried directly to the pulp reservoir, thus
125 obviating the labor required to shovel it off from the pit as in the common practice. In addition to the saving of labor and steam, time is saved which can be applied to starting the succeeding operation. In this way it has been
130 found that one extra "cook" in four can be obtained by this digester.

I am aware that digesters have been lined with molded cement, the mold being afterward

removed, and also that facing tile have been laid against this molded cement after the removal of the mold.

Having thus described my invention, what I desire to secure by Letters Patent is—

1. In a digester the combination of the shell and the cemented tile lining, with suitably formed cemented tile continuing the lining throughout the openings in the shell; substantially as set forth.

2. In a digester the combination of the shell and the cemented tile lining, with suitably formed cemented tile continuing the lining throughout an opening in the shell and the ring surroundings said tile adjacent to the edge of the shell; substantially as set forth.

3. A sulphite digester comprising a tile mold, a shell - mold and an intermediately molded layer of cement such as described.

4. A sulphite digester comprising a tile mold made of unglazed tile, a shell-mold and an intermediately molded layer of cement such as described.

5. In a sulphite digester a removable cover, a packing, a perforated basket having a flange fixed to said cover and resting upon said pack-

ing, the body of the basket extending below the cover and within the digester neck, a space being left between the wall of said neck and the basket to permit fluid to circulate about the sides of the latter below the packing; substantially as set forth.

6. In a sulphite digester having a fluid discharge pipe in its bottom and a discharge opening or manhole situated in its side and provided with a cover, the perforated diaphragm situated in the same plane as the bottom of said manhole and a pipe also in practically the same plane and provided with a blow off valve; substantially as set forth.

7. In a digester having removable covers an adjustable telescoping water gage having separable parts and having communication with the digester through the said covers; substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOSHUA NORTON, JR.

Witnesses:

JOHN W. LOGGIE,
A. A. ANDERSON.