J. O. LUNDBERG.

APPARATUS FOR HEATING LIQUIDS.

APPLICATION FILED FEB. 28, 1916.

1,215,041. Patented Feb. 6, 1917.

Fig. 1.

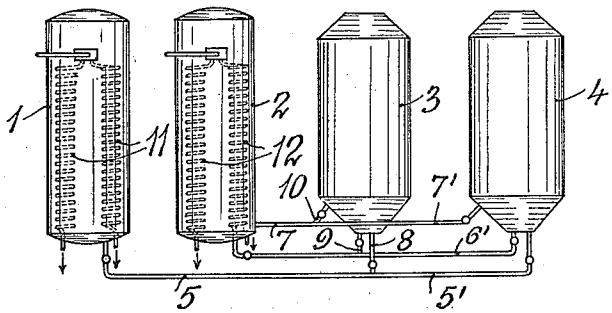


Fig. 2.

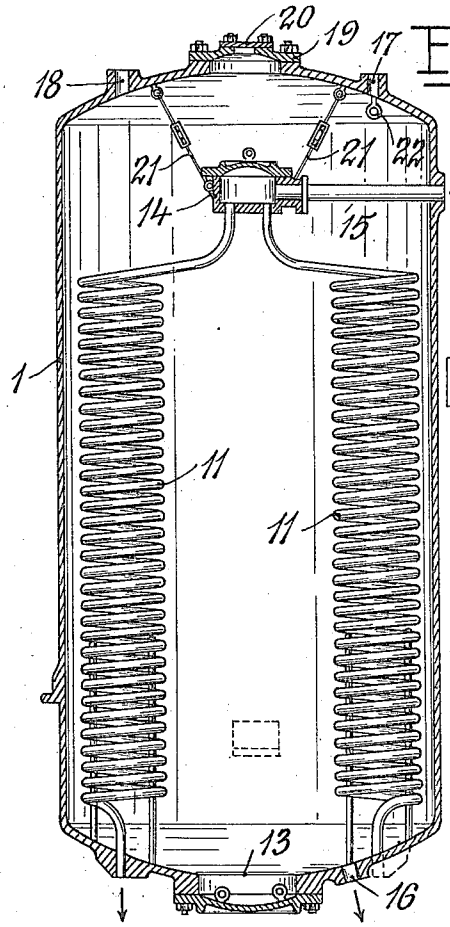
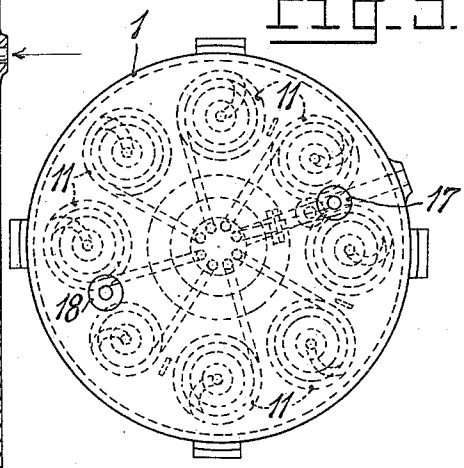


Fig. 3.



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UNITED STATES PATENT OFFICE.

JACOB OTTO LUNDBERG, OF TORP BRUG, PR. FREDRIKSTAD, NORWAY.

APPARATUS FOR HEATING LIQUIDS.

1,215,041. Specification of Letters Patent. Patented Feb. 6, 1917.

Original application filed November 9, 1914, Serial No. 871,185. Divided and this application filed February 28, 1916. Serial No. 80,993.

To all whom it may concern:

Be it known that I, JACOB OTTO LUNDBERG, civil engineer, a citizen of Norway, residing at Torp Brug, pr. Fredrikstad, Norway, have invented new and useful Improvements in Apparatuses for Heating Liquids, of which the following is a specification, and is a division of my application Serial No. 871,185, filed November 9, 1914.

The present invention has for its object to provide an apparatus for heating liquids, especially digesting liquid for chemical wood pulp factories, whereby it will be possible to rapidly heat the liquid to the desired temperature and pressure.

The apparatus is especially suitable for use in digesting chemical wood pulp according to a method, in which the principal part of the heat required is introduced into the digester through the digesting liquid heated beforehand under pressure.

The invention is illustrated in the accompanying drawing, in which:

Figure 1 illustrates diagrammatically a wood pulp digesting plant including two heating apparatuses constructed according to this invention.

Fig. 2 is a vertical section through the heating vessel drawn to a larger scale.

Fig. 3 is a plan view corresponding to Fig. 2.

In Fig. 1 of the drawing 1 designates a reservoir for fresh digesting liquor. —2— is a reservoir for "black liquor" (that is liquor which has already been used), 3 and 4 designate the digesters.

5—10 designate connection pipes between the reservoir and the digester.

—11— and —12— are steam coils for effecting the heating of the liquor in the reservoirs.

Owing to the high temperature and high pressure prevailing in the reservoirs it is of the greatest importance that the reservoirs be of a suitable construction and so arranged as to enable the same of being easily and quickly repaired. At the same time it is of fundamental importance that the reservoirs be provided with the largest heating surface possible and that they be so arranged that an efficient circulation of the liquor during the heating operation is promoted. By means of the heating reservoir illustrated in Figs. 2 and 3 of the accompanying drawing these requirements are satisfied by quite simple and inexpensive means.

The result is obtained by arranging in a comparatively high cylindrical vessel —1— a number of long heating worms which are placed annularly beside one another in the peripherical part of the vessel. The outer diameter of the worm windings are so proportioned that each of the heating worms may be removed or inserted through the manhole —13— in one piece and without being obstructed by the other heating worms.

The upper end of each heating worm is inserted in a common steam inlet box —14— and is supplied with steam from this latter. The box —14— communicates with the steam generator through a pipe —15— inserted through the wall of the reservoir. The lower end of each heating worm is inserted directly through the wall of the reservoir and fits tight against the same.

The steam box —14— is suspended by rods —21— in such manner that the box may be easily removed. The opening —16— communicates with the digester through a pipe (not shown). —17— and —18— are openings for blow off cocks (not shown). —19— is a cover of the upper manhole and —20— is an easily removable cover for the introduction of liquor. —22— is a lug on the reservoir wall destined for fastening of a tackle or the like for use when introducing or removing the heating worms.

When the vessel is filled with liquor and the heating coils are supplied with steam a rapid circulation takes place the liquor flowing from the bottom of the reservoir upward through the tubular channels formed by the heating worms, and down through the central space formed between the heating worms. Owing to this rapid circulation and the extremely large heating surface formed by the special arrangement of the heating worms the whole content of the vessel can in a very short time be brought upon the high temperature necessary for the process.

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

1. In an apparatus for heating liquids, the combination of a cylindrical vessel, a series of longitudinally arranged heating worms one beside the other in the peripherical part of the vessel so that in the central part

of the vessel an open space is formed of a diameter not less than that of the worm windings, and a manhole arranged in the vessel and having a diameter not less than that of the worm windings.

2. In an apparatus for heating liquids, the combination of a cylindrical vessel, a series of longitudinally arranged heating worms one beside the other in the peripherical part of the vessel so that in the central part of the vessel an open space is formed of a diameter not less than that of the worm windings and a manhole arranged in the vessel and having a diameter not less than that of the worm windings, a steam box suspended in the vessel and receiving the ends of the heating worms, and a steam supply pipe fitted tightly in the steam box and in the wall of the vessel.

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

JACOB OTTO LUNDBERG.

Witnesses:
AXEL ZAHN,
MOGERIS BRIGGS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."