A. F. RICHTER.

COMBINATION DIGESTER.

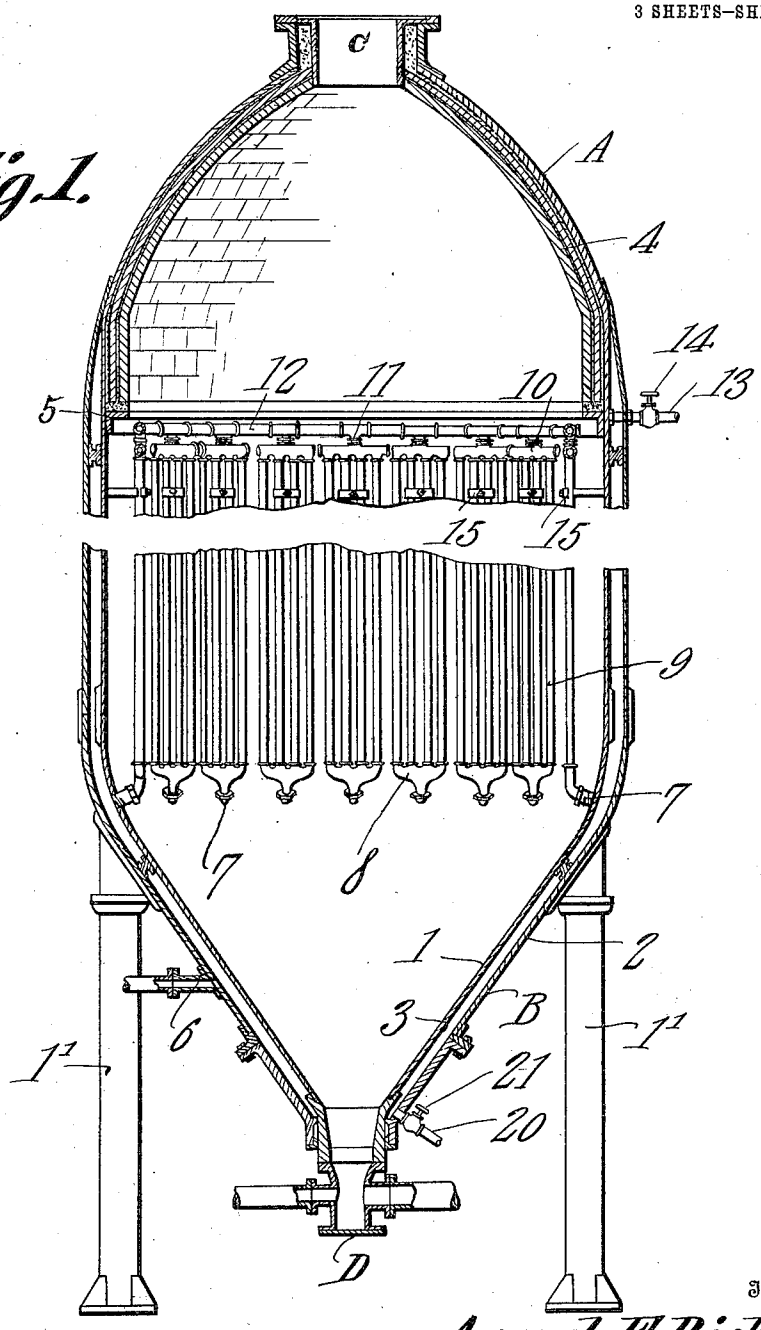
APPLICATION FILED APR. 4, 1910.

1,031,088.

Patented July 2, 1912.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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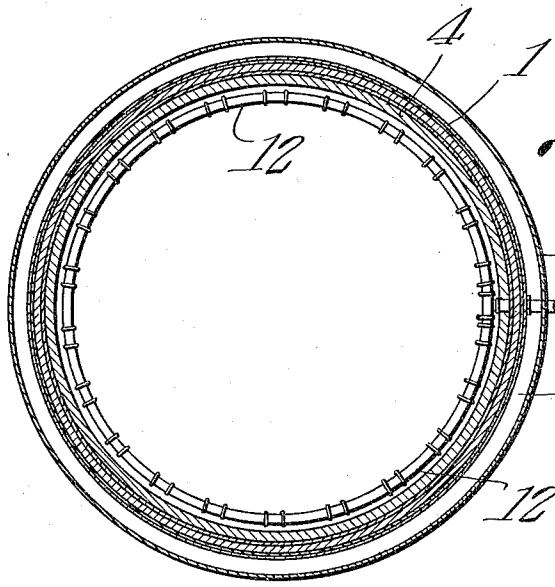

Fig. 2.

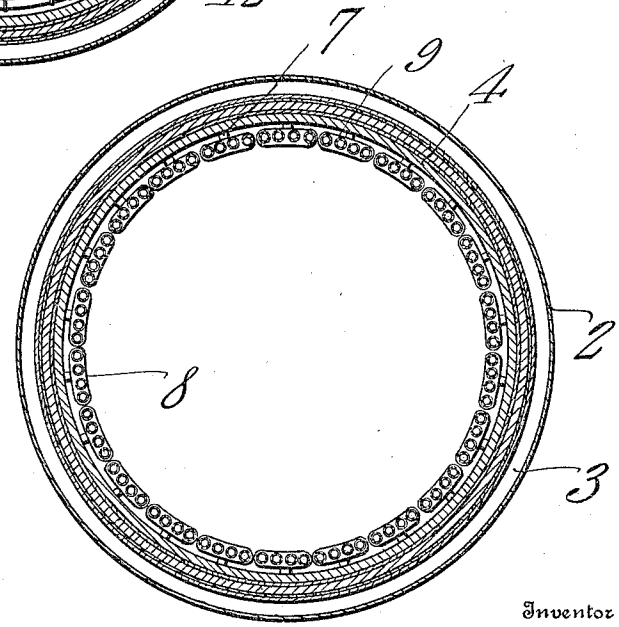

Fig. 3.

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3 SHEETS—SHEET 3.

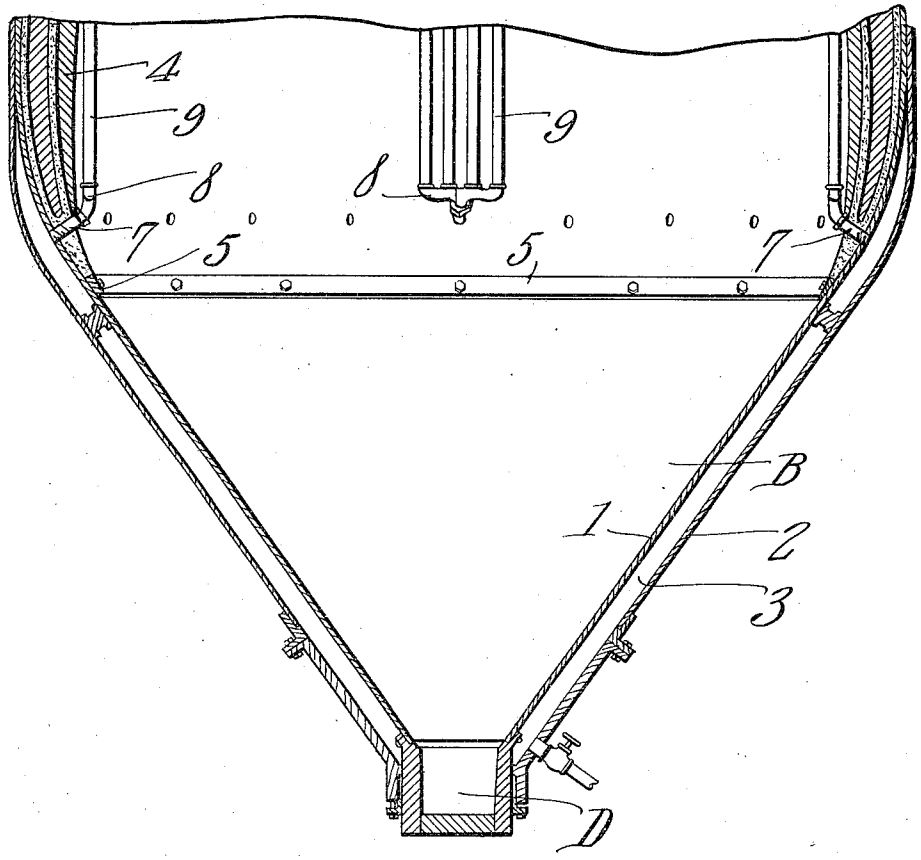

Fig. 4.

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UNITED STATES PATENT OFFICE.

AUGUST FREDERICK RICHTER, OF WATERTOWN, NEW YORK.

COMBINATION-DIGESTER.

1,031,088. Specification of Letters Patent. Patented July 2, 1912.

Application filed April 4, 1910. Serial No. 553,211.

To all whom it may concern:

Be it known that I, AUGUST F. RICHTER, a citizen of the United States, residing at Watertown, in the county of Jefferson and State of New York, have invented a new and useful Combination-Digester, of which the following is a specification.

This invention relates to what may be termed a combination digester for use in the production of fiber intended to be used in the manufacture of paper.

The object of the invention is to provide a digester which can be used in the chemical process of producing fiber from chips and the like and in which a relatively weak solution may be used in order to produce a high quality of fiber.

A further object of the invention is to provide a digester which is adapted to treat the contents thereof with the maximum of efficiency and the minimum of time.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiments of invention may be made within the scope of the claims without departing from the spirit of the invention.

In the accompanying drawings forming part of this specification, Figure 1 is a vertical section through a combination digester constructed in accordance with the present invention, said digester being partly broken away; Fig. 2 is a transverse section through the digester shown in Fig. 1 on a line above the steam supply pipe; Fig. 3 is a transverse or horizontal section similar to Fig. 2 taken on a line through the steam pipe; and Fig. 4 is a view similar to Fig. 1 showing the lower portion of a slightly modified form of the digester.

Like reference numerals indicate corresponding parts in the different figures of the drawings.

The device of the present invention, briefly outlined, comprises a digester formed with a suitable lining and having adjacent the lower portion thereof a suitable steam jacket, surrounding the portions of the digester which are unlined, said steam jacket being in communication with a plurality of steam heating pipes located within the body of the digester, the object being to combine the advantages of a heating jacket, and internally disposed heating coils, without interfering with or losing any of the efficiency of the lining at the proper point.

The digester of the present invention is supported in any suitable manner preferably in vertical position, by means such as the uprights 1′, and consists preferably of an upper portion or dome indicated generally by the reference letter A, a lower portion or cone indicated generally by the reference letter B, a mouth C by means of which the chips or other material are fed to the digester, and a lower end or blow-out indicated generally by the letter D, by means of which the contents of the digester are removed at proper times.

The digester proper consists preferably of an inner shell 1 and an outer shell 2 forming between them a suitable steam jacket or chamber 3. The outer shell 2 of the steam chamber 3 may extend upward to any desired distance short of the lower portion of the dome A; that is to say it is unnecessary to extend the steam jacket any higher than the approximate lower portion of the dome A. For example, in the preferred form shown in Fig. 1 the steam jacket extends to the base of the dome A, whereas in the modified structure illustrated in Fig. 4 the jacket extends merely to the upper end of the cone. The lining 4 preferably consists of a plurality of layers of acid proof tile laid in an intermediate acid proof composition of any suitable character. The lining 4 preferably starts approximately at the point where the steam jacket terminates and extends from that point on up to the top of the digester. It is found in practice that by thus arranging the steam jacket and the inner lining, neither one interferes with the action, strength or efficiency of the other. That is to say the lining does not interfere with the steam jacket and the steam jacket does not prevent the lining from being securely held in place adjacent the dome of the digester where it is chiefly needed.

In order to prevent the acid liquor from working its way in between the lining and the steel shell of the digester, a ring 5 of bronze or other suitable material is secured to the inner shell of the digester at the point

where the lining begins. The ring 5 thus serves the two-fold purpose of supporting the lining 4 and of preventing the acid liquor from working its way in between the lining and the shell so as to injure the latter.

Steam is supplied to the jacket 3 through a suitable steam inlet pipe 6. From the jacket 3 the steam passes through a plurality of pipes 7 to a plurality of manifolds 8 with which are connected steam heating pipes 9. The different heating pipes 9 in each set thereof, are connected with each other at their upper ends by a plurality of manifolds 10, each of which is connected by means such as the pipe 11 with a circular steam pipe 12 having at one point therein an outwardly extending vent pipe 13 provided with a valve 14. The different sets of steam heating pipes 9 are suitably secured in place by means such as the brackets or clamps 15. It will be noted that the pipes 7 connected with the manifolds 8, in the embodiment of invention shown extend into the jacket 3.

In operation, the digester is charged with chips or other material to be converted into pulp, together with the cooking liquor. Steam is immediately admitted at the pipe 6 and maintained at a low pressure, say forty pounds. As soon as the digester has been filled and the cover plate secured at the top C, the steam pressure within the jacketed cone is raised rapidly to the desired pressure, generally 85 to 100 pounds, and the vent 13 at the top of the circulating coil is opened sufficiently to permit the escape of any accumulation of air which may have become trapped. The heat radiation is very rapid throughout the entire digester by reason of the greatly increased area of heating surface opposed to the liquor due to this style of construction and a temperature equal to boiling point is soon reached, at which time the steam inlet valve is regulated to accord with the conditions, or the cooking time desired. The condensation formed within the coils falls by gravity into the bottom and then into the cone jacket, from which it is drawn by means of the pipe 20 provided with a valve 21. A suitable steam trap (not shown) may be used.

The action of the steam in the external steam jacket, causes a coating to form on the unlined section of the cone, and this coating protects the same from the corrosive action of the acid liquor. This coating, however, is not allowed to accumulate to a thickness or extent where it will retard the proper action of the heat within the steam jacket upon the contents of the digester.

The digester of the present invention is formed with a large amount of heating surface by means of which rapid cooking is produced and a correspondingly greater capacity for a stated size of digester is possible. Moreover a better quality of pulp is obtained by reason of the fact that the steam or heating medium is kept out of contact with the acid liquor or pulp, so that the water of condensation cannot dilute the acid liquor so as to render it necessary to employ a strong acid liquor in order to counteract the effect of the water of condensation. That being the case, it is possible to employ a relatively weaker acid liquor, for which reason a high grade of pulp is secured.

The device of the present invention is not to be limited to any particular process. It can be used with either the sulfite process or the soda and sulfate process of producing pulp. Moreover it can be used in other lines of manufacture and in other industries.

What is claimed as new is:—

1. A partially lined and partially jacketed digester, the lining terminating approximately at the upper end of the jacket, and internal heating means in said digester.

2. A digester comprising a shell having at one portion thereof an inner lining and at another portion thereof an outer jacket, the lining terminating approximately where the lining begins, and internal heating means in said digester.

3. A digester having a jacketed cone and a plurality of internally disposed heating devices located around the central portion of the digester, and away from the lower end thereof, said jacket and heating devices being in communication with each other.

4. A digester having a dome provided with a lining, a steam jacket located below the dome, a plurality of internally disposed heating devices connected with said jacket, and means for supplying steam to said jackets and pipes.

5. A digester having a lined dome and a jacketed cone, the lining terminating at the upper end of the jacketed cone, and intermediately disposed internal heating devices.

6. A digester having a lined dome, a jacketed cone and intermediately disposed internal steam pipes.

7. A digester having a lined dome, a jacketed cone, and intermediately disposed internal heating devices.

8. A digester having a dome formed with a lining, a cone at the lower end thereof formed with a steam jacket, a plurality of steam pipes located inside of said digester intermediate the dome and the cone, and connections between the said pipes and said steam jacket.

9. A digester having a dome formed with a lining, a cone at the lower end of said digester, a steam jacket around said cone, means for supplying steam to said jacket, a plurality of manifolds in communication with said jackets, pipes connected with said manifolds and extending upwardly, a second set of manifolds connected with the

upper ends of said pipes, a circular distributing pipe connected with each of said second set of manifolds, a vent pipe connected with said distributing pipe, and means for withdrawing water of condensation from the said jacket.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

AUGUST FREDERICK RICHTER.

Witnesses:
R. O. YOUNG,
E. J. DAULTON.