

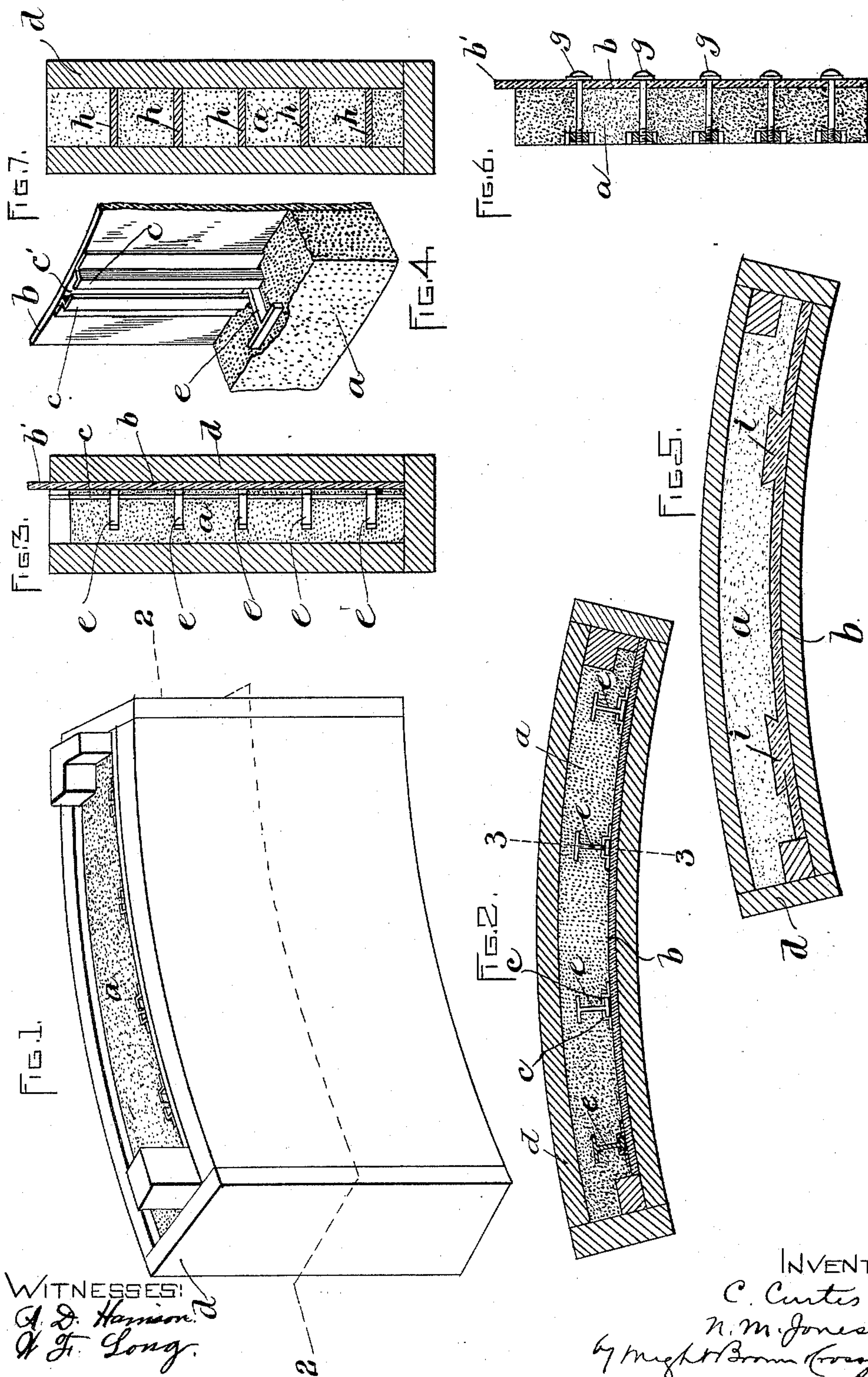
(No Model.)

2 Sheets—Sheet 1.

C. CURTIS & N. M. JONES.
PAPER PULP DIGESTER.

No. 485,809.

Patented Nov. 8, 1892.



WITNESSES:
A. D. Harrison
H. F. Long.

INVENTORS:
C. Curtis
N. M. Jones
by Wright Brown (Attorney)

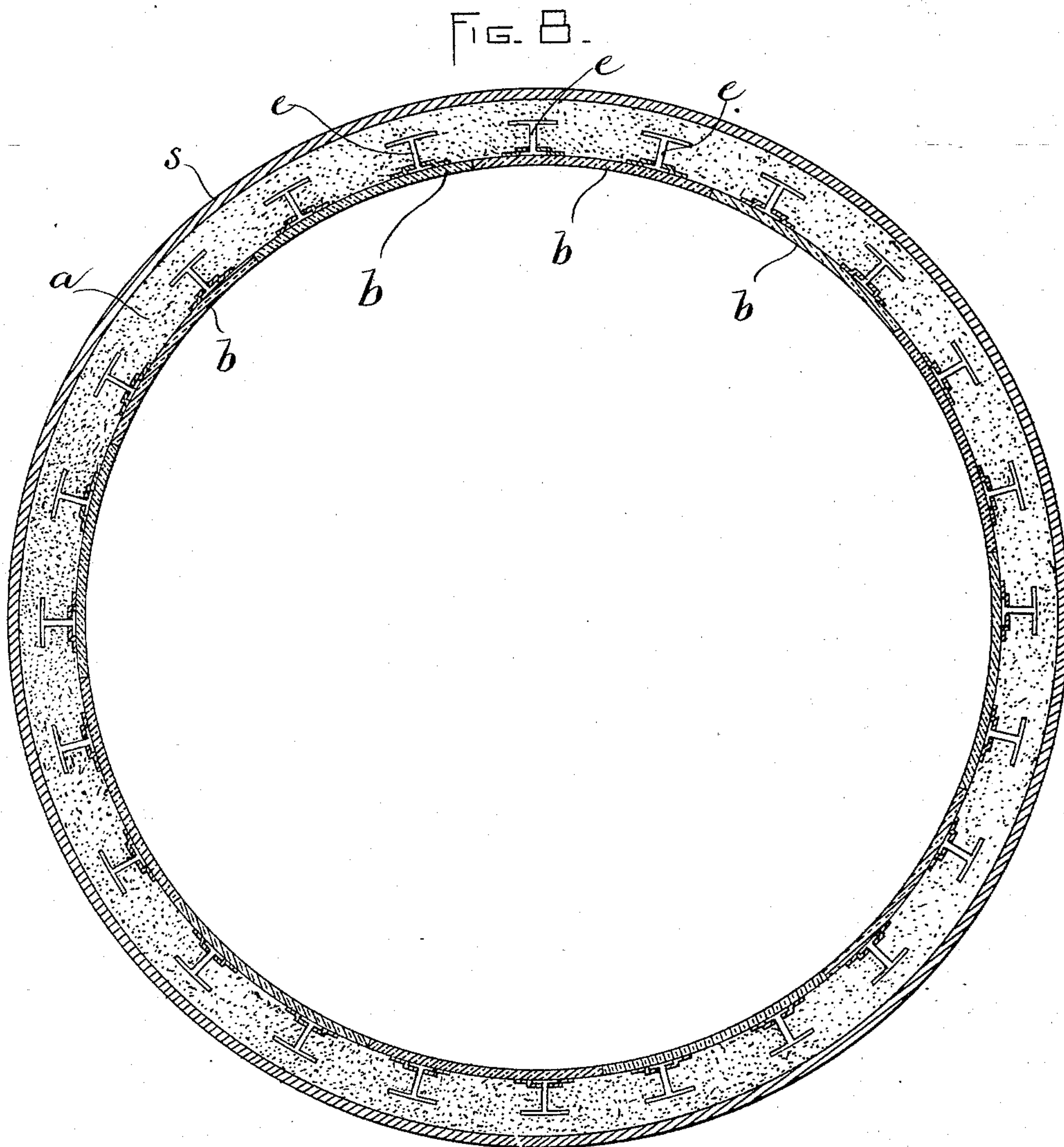
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PAPER PULP DIGESTER.

No. 485,809.

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WITNESSES.
A. D. Hanson.
W. F. Long.

INVENTORS:
C. Curtis
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UNITED STATES PATENT OFFICE.

CHARLES CURTIS, OF NEWTON, MASSACHUSETTS, AND NATHANIEL M. JONES, OF BANGOR, MAINE.

PAPER-PULP DIGESTER.

SPECIFICATION forming part of Letters Patent No. 485,809, dated November 8, 1892.

Application filed May 4, 1892. Serial No. 431,832. (No model.)

To all whom it may concern:

Be it known that we, CHARLES CURTIS, of Newton, in the county of Middlesex and State of Massachusetts, and NATHANIEL M. JONES, of Bangor, in the county of Penobscot and State of Maine, have invented certain new and useful Improvements in Paper-Pulp Digesters, of which the following is a specification.

10 This invention relates to linings for digesters used for cooking or disintegrating wood chips for the manufacture of paper-pulp, particularly to linings composed of blocks of cement adapted to be assembled to form an inner wall or lining upon the inner surface of a metal digester-shell. In another application filed by us April 18, 1892, Serial No. 429,525, we have shown a digester-lining composed of a series of cement blocks, each faced independently with a plate of lead or other acid-resisting material, the lead plates being secured to the cement blocks only at the edges of said blocks. We find that when the said lining-plates are attached to the cement blocks only at their margins there is liability of the lining-plates being caused to bulge inwardly at their central portions, particularly when a partial vacuum is formed in the digester, as is liable to be the case at certain stages of the operation.

30 The object of the present invention is to enable the lining-plates to be attached more intimately to the cement which supports them than heretofore, and thereby prevent the bulging or separation of the plates or any considerable portion thereof from the cement.

To this end the invention consists in the improvements which we will now proceed to describe and claim.

40 In the accompanying drawings, forming a part of this specification, Figure 1 represents a perspective view of a mold or flask used in making a cement block and applying an acid-resisting lining thereto during the process of manufacture. Fig. 2 represents a section on line 2 2, Fig. 1. Fig. 3 represents a vertical section on line 3 3, Fig. 2. Fig. 4 represents a perspective view of a portion of a cement block and a portion of the acid-resisting lin-

ing secured thereto in accordance with our invention. Fig. 5 represents a view similar to Fig. 2, showing a different form of the lining. Fig. 6 represents a vertical section of a cement block and an acid-resisting lining thereon, this view showing a modification of the means of securing the lining. Fig. 7 represents a vertical section of the flask used in forming the cement block for the attachment of the lining, as shown in Fig. 6. Fig. 8 represents a horizontal sectional view of a complete digester.

The same letters of reference indicate the same parts in all of the figures.

In the drawings, *a* represents a block of cement, and *b* represents a plate of acid-proof material applied to the inner surface of said block, said plate being of lead or any other suitable metal adapted to resist the acid solution employed in disintegrating wood chips. For the sake of convenience we will call said plate the "lining." The cement block *a* may be one of a series of blocks which, collectively, form a lining adapted to fit the interior of a cylindrical or other shaped metal shell, and the general form of said block may be the same as that shown in our above-mentioned application, or it may be of any other suitable form.

In carrying out our invention we secure the lining *b* to the cement *a* at a number of different points between the edges of the lining instead of attaching it at its edges only, as heretofore. To this end we secure to the lining a plurality of fastening devices adapted to be molded in or engaged with the cement, said fastening devices being suitably secured to the lining and projecting from the back thereof into the cement, there being a sufficient number of said fastening devices to firmly engage the lining with the cement and prevent bulging or blistering of the lining to any material extent. In Figs. 1, 2, 3, and 4 we show the preferred manner of connecting the cement and the lining by means of the fastening devices above mentioned. In said figures we show parallel strips *c c*, of any suitable material, formed on or attached to the back of the lining *b*, said strips being

separated from each other by a slot c' and being offset at their inner edges from the lining, so that each pair of strips forms a slot-
5 of the lining.

d represents a flask or mold into which the lining, having the strips c on its back, is placed, the lining resting against one side of the flask. The cement is placed in the flask
10 and suitably compressed therein to form a block, this being usually done by placing a small quantity of cement in the flask and pounding or compressing it therein, then inserting fastening devices, as hereinafter de-
15 scribed, then placing more cement in the flask and compressing it, then more fastening devices, and so on. As the building up of the cement block progresses fastening devices e , which are preferably substantially I-shaped,
20 as shown in Figs. 2 and 4, are inserted in the sockets between the strips c , said fastenings being of such length that portions thereof are embedded in the cement, each fastening being covered by cement after it has
25 been put in place. It will be seen that in this way we build up a cement block and at the same time unite it firmly with the lining, so that when the flask is filled and the cement is suitably hardened the lining and block
30 may be removed together, the two being then firmly united and ready for use. There may be any desired number of pairs of strips c , and each pair of strips may be engaged with any desired number of fastening devices e .

35 We do not limit ourselves to the described form of the fastening devices e when the same are engaged with the lining in the manner above described, as said fastening devices may be of any other suitable form whereby
40 their inner ends may be engaged with the sockets on the back of the lining and their outer ends with the cement. Neither do we limit ourselves to the described manner of connecting the fastening devices with the
45 lining, as any other suitable means may be employed. In Fig. 6 we show the lining secured to the cement block by a series of bolts g , which may be of any suitable material adapted to resist the action of acid—such, for
50 example, as phosphor-bronze. In forming the cement block for the reception of said bolts we place rods h in the cement while the latter is being formed into a block in the flask d , as shown in Fig. 7. After the removal of the
55 block from the flask, the rods h are forced out and the bolts g passed through the lining and inserted in the holes formed by the rods, the other ends of the bolts being secured upon the backs of the cement blocks by nuts or in
60 any other suitable way.

Our invention is not limited to the employment of fastening devices made in separate parts or pieces from the lining. In Fig. 5 we show the lining provided on its back with
65 dovetailed ribs i , which are cast or other-

wise formed integral with the lining. In this case the cement block is built up on the back of the lining, as already described, the lining being placed in a flask d , so that when the block is completed it is firmly engaged with
70 the dovetail ribs.

Various other modifications may be made in the manner of forming the lining and a cement support therefor and of connecting
75 the lining to the cement without departing from the spirit of our invention. The lining may be made longer than the cement block, forming a flange b' , Fig. 6, which will overlap a portion of the lining of the next block
80 and may be partially melted along its edge, and thus soldered to the lining of the next block, said flange covering the joint between the blocks, the edges of the cement blocks themselves being, if desired, cemented to-
85 gether when building up the lining in the digester.

The cement a may be formed in one continuous piece or body covering the entire inner surface of the digester-shell s , as shown
90 in Fig. 8, and the lining-plates b may be applied in a series of sheets or pieces to the inner surface of the cement by any of the methods above described or by any other
95 suitable method. In lining a digester-shell as last indicated the lining-plates b may be put in position row by row at a suitable distance from the inner surface of the digester-shell and the continuous cement lining built
100 up between the lining-plates and digester-shell, this process being continued until the entire shell is internally covered with a continuous lining of cement internally protected by a series of rows of independent plates, each
105 attached to the cement at a number of points between its edges.

We claim—

1. A digester composed of a shell, a cement lining, and a series of independent metallic acid-resisting lining-plates, each connected to
110 the cement at a number of points between its edges, as set forth.

2. The combination, with a digester-shell and a cement lining therefor, of a series of metallic acid-resisting lining-plates, each having a plurality of fastening devices secured
115 to it and to the cement lining at points within the edges of the plates, as set forth.

3. A digester lining-block composed of cement, having a metallic acid-resisting lining-plate attached to its inner surface by a plurality of fastening devices projecting from the
120 back of said plate at points between the edges thereof.

4. The combination of a metallic acid-resisting lining-plate, a series of fastening devices projecting from the back of the plate, and a cement support formed upon said fastening
125 devices, as set forth.

5. The combination of a metallic acid-resisting lining-plate having sockets on its back, 13

a series of fastening devices, each engaged at one end with one of said sockets and provided with a headed outer end, and a cement support formed upon the headed ends of said fastenings, as set forth.

5 In testimony whereof we have signed our names to this specification, in the presence of

two subscribing witnesses, this 25th day of April, A. D. 1892.

CHARLES CURTIS.

NATHANIEL M. JONES.

Witnesses:

C. F. BROWN,

A. D. HARRISON.