

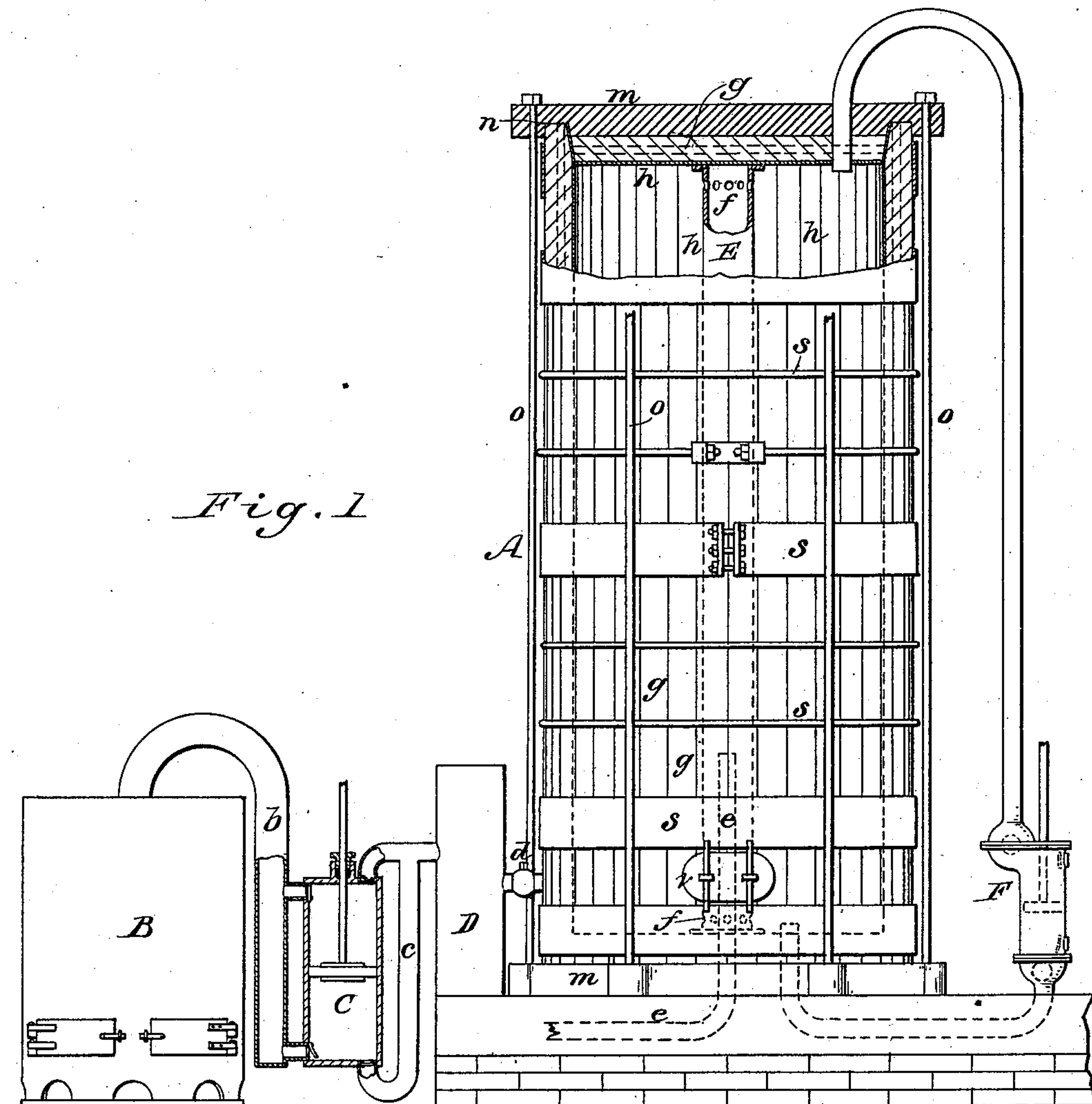
(No Model.)

F. B. ERWIN.

APPARATUS FOR PREPARING WOOD AND OTHER FIBROUS MATERIAL  
FOR CONVERSION INTO PULP.

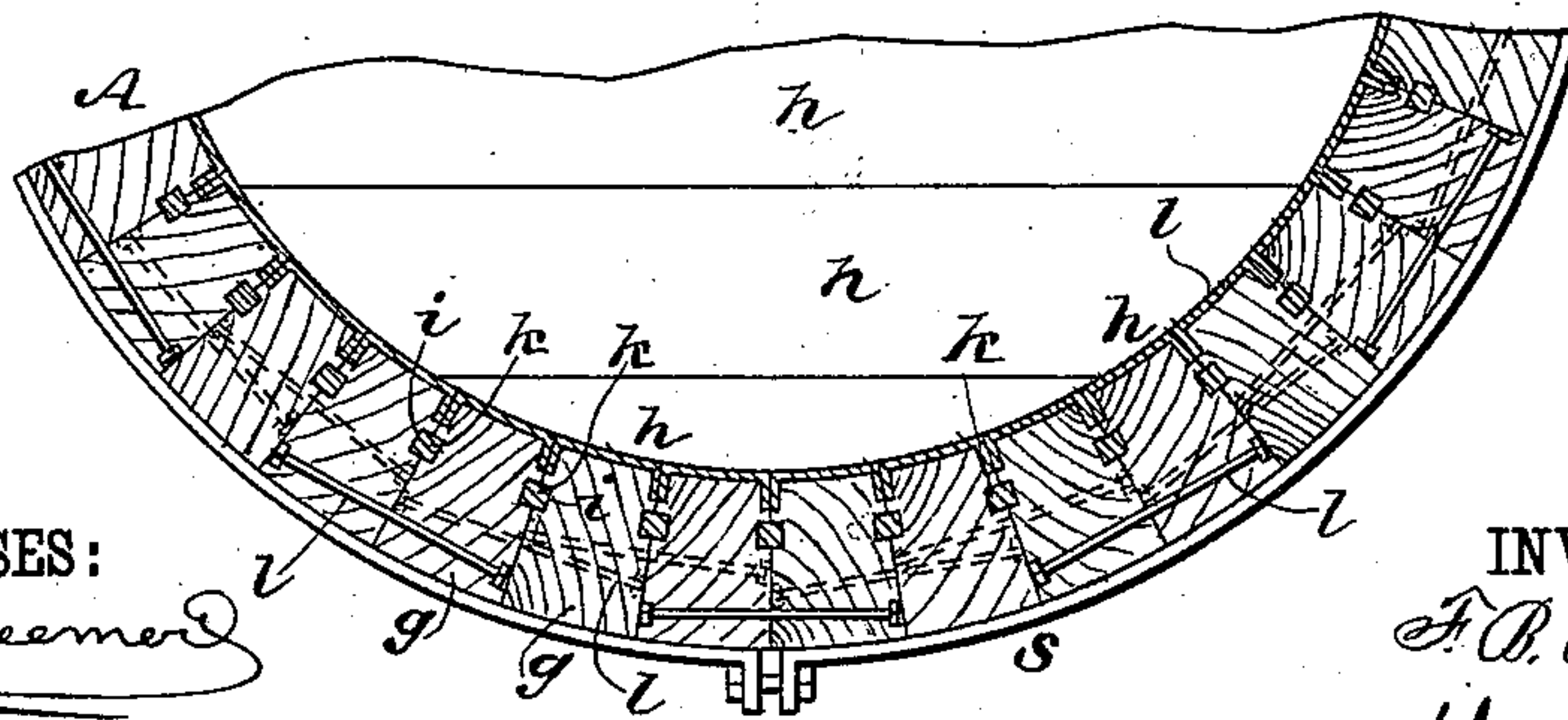
No. 353,056.

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*Fig. 1*

*Fig. 2.*



WITNESSES:

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# UNITED STATES PATENT OFFICE.

FRANKLIN B. ERWIN, OF ELKHART, INDIANA.

APPARATUS FOR PREPARING WOOD AND OTHER FIBROUS MATERIAL FOR CONVERSION INTO PULP.

SPECIFICATION forming part of Letters Patent No. 353,056, dated November 23, 1886.

Application filed March 11, 1886. Serial No. 194,842. (No model.)

*To all whom it may concern:*

Be it known that I, FRANKLIN B. ERWIN, of Elkhart, in the county of Elkhart and State of Indiana, have invented new and useful Improvements in Apparatus for Preparing Wood and other Fibrous Material for Conversion into Pulp, of which the following is a full, clear, and exact description.

This invention relates to machines or apparatus for preparing and converting by the action of sulphurous acid wood and other fibrous materials ready for introduction to the pulping-engine, to make the same into pulp suitable for the manufacture of paper and for other purposes.

The invention consists in certain combinations of devices whereby the acid used for the treatment of the wood, &c., is produced under pressure; and the invention furthermore consists in a novel construction of certain parts or devices, including the digester, substantially as hereinafter shown and described.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in both the figures.

Figure 1 represents a partly sectional elevation of an apparatus embodying my invention, and Fig. 2 a horizontal section upon a larger scale of the digester in part.

A indicates the boiler or digester in which the wood or other fibrous material to be treated is placed. For convenience' sake, wood only will here be referred to. The digester after having been charged with the wood, which may be in the form of chips, shavings, or larger pieces, and also with lime-water together with the wood, is sealed or closed. If desired, however, the lime-water may be subsequently introduced, as hereinafter described.

B is a furnace adapted to burn sulphur, brimstone, or any other substance that the fumes of sulphur may be obtained from. The fumes thus produced are drawn off from said furnace through a pipe, *b*, by a force-pump, C, or two or more pumps may be used, if desired, and are forced into the digester A, or by a pipe, *c*, into a receiver, D, and from thence, subject to control by a cock, *d*, into the digester. These fumes mingling with the lime-water of suitable strength for the purpose produce the sul-

phurous acid of the requisite strength to act upon the wood under treatment in the digester. A meter-test of the acid of about four and a half ( $4\frac{1}{2}$ ) degrees will answer. Steam, which hastens the action, is then introduced into the digester at any suitable point. The pressure of the steam I find most desirable is about twenty-five pounds (25 lbs.) to the square inch; but it may be more or even less, and I prefer to introduce it through the bottom of the digester, as by a lead pipe, *e*, arranged to project twenty inches, more or less, up into a larger lead tube, E, extending from the top to the bottom of the digester within it, and provided with a series of perforations, *f*, near its top and bottom, whereby not only egress is established for the steam into the mass, but the liquid in the digester entering by the lower perforations *f* is forced up through the pipe or tube E and out through the upper perforations *f*, thus producing a circulation within the digester. The steam, however, may be otherwise admitted or the circulation be established mechanically, as by a circulating-pump, F, connecting with the upper and lower ends of the digester, or both means of producing the desired circulation may be used. This treatment may be kept up for about eight or nine hours, more or less, after which the mass in the digester, thus boiled under pressure, may be removed, and the wood will be reduced to its proper condition for treatment in the pulping-engine.

Instead of introducing the lime-water into the digester along with the wood, or before introducing the sulphur fumes, the latter may be introduced before the lime-water is admitted, if desired, the effect being the same in either case.

The method herein described of producing under pressure the sulphurous acid in the digester will be found not only to save time, but to be more economical generally.

The digester A is of peculiar construction. Its body is built up, for instance, of wooden staves *g* of any required thickness, width, and length, with a lining of lead made in sections forming facings *h* to the staves, which lead facings are bent so as to lap into the joints between the staves to protect the latter from the action of the acid. Furthermore, the staves



have grooves *i* plowed in their sides, within which lead is poured to form tongues *k* at or near the lapped edges of the lead lining to close all crevices or passages between the staves. The staves are drawn up tight by a series of inclosed bolts, *l*, arranged to pass laterally through them or through each adjacent pair. The upper and lower ends or heads of the digester are similarly constructed of separate pieces or staves *g*, lined with lapping lead facings *h*, and heavy top and bottom metal covers, *m*, grooved as at *n* to receive the projecting ends of the body-staves, are applied to the structure, which covers are bolted together by bolts *a*, arranged on the outside of the body of the digester to give the requisite strength to the latter, hoops *s* also being applied thereto. A man-hole closed by a cover, *v*, is arranged near the bottom of the digester for discharging the contents of the latter, and a similar man-hole may be arranged in the top of the digester for charging the digester with wood, &c.

I am aware that it is old to draw the gases employed in treating fibrous material from the generator and force them into the digester or receiver by means of a pump or fan, and I therefore do not claim such invention.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In apparatus for preparing wood and other fibrous material for conversion into pulp, the combination, with the boiler or digester, of a furnace for producing sulphur-fumes, a pump for drawing said fumes from the furnace and forcing them into the digester, a receiver for said fumes interposed between the pump and the digester, and means for producing a circulation therein, essentially as described.

2. The combination, with the digester A, of the steam-pipe *e*, and perforated tube or pipe E, the furnace B, the pump C, and the receiver D, substantially as and for the purpose herein set forth.

3. The digester A, constructed of staves *g*, lead facings *h*, applied to said staves and bent to enter within the joints of the same, and lead tongues *k*, arranged to engage with the sides of the staves, substantially as described.

4. The combination, with the staves *g*, composing the body of the digester, of the tightening-bolts *l*, inclosed within the staves and arranged to pass laterally through them, essentially as shown and described.

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Witnesses:

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