

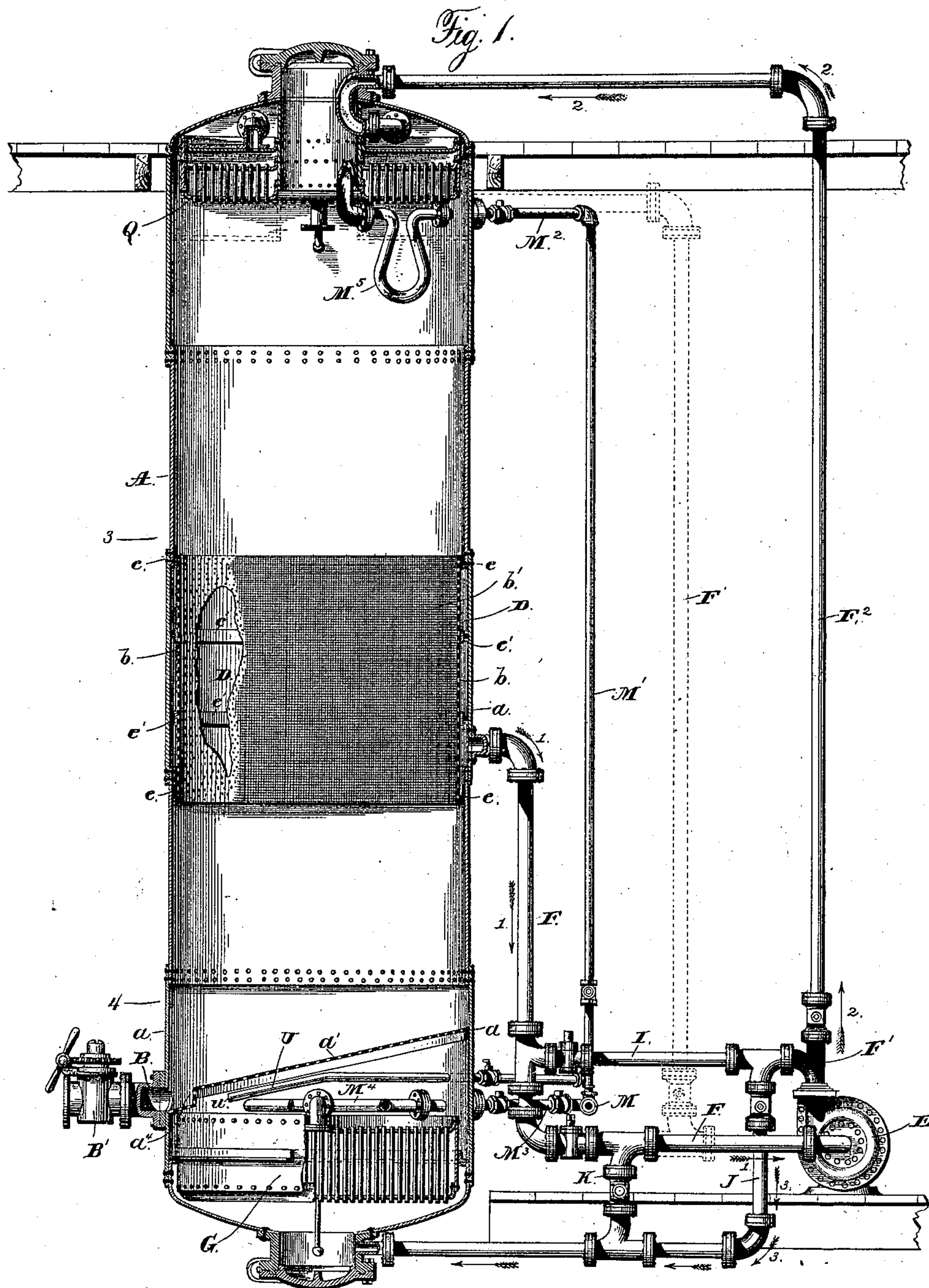
(No Model.)

3 Sheets—Sheet 1.

A. SELKIRK.  
DIGESTING APPARATUS.

No. 486,130.

Patented Nov. 15, 1892.



Witnesses:

Jas. C. Hutchinson  
Henry C. Hazard

Inventor:

Alexander Selkirk, by  
Prindle and Russell, his Attys.

(No Model.)

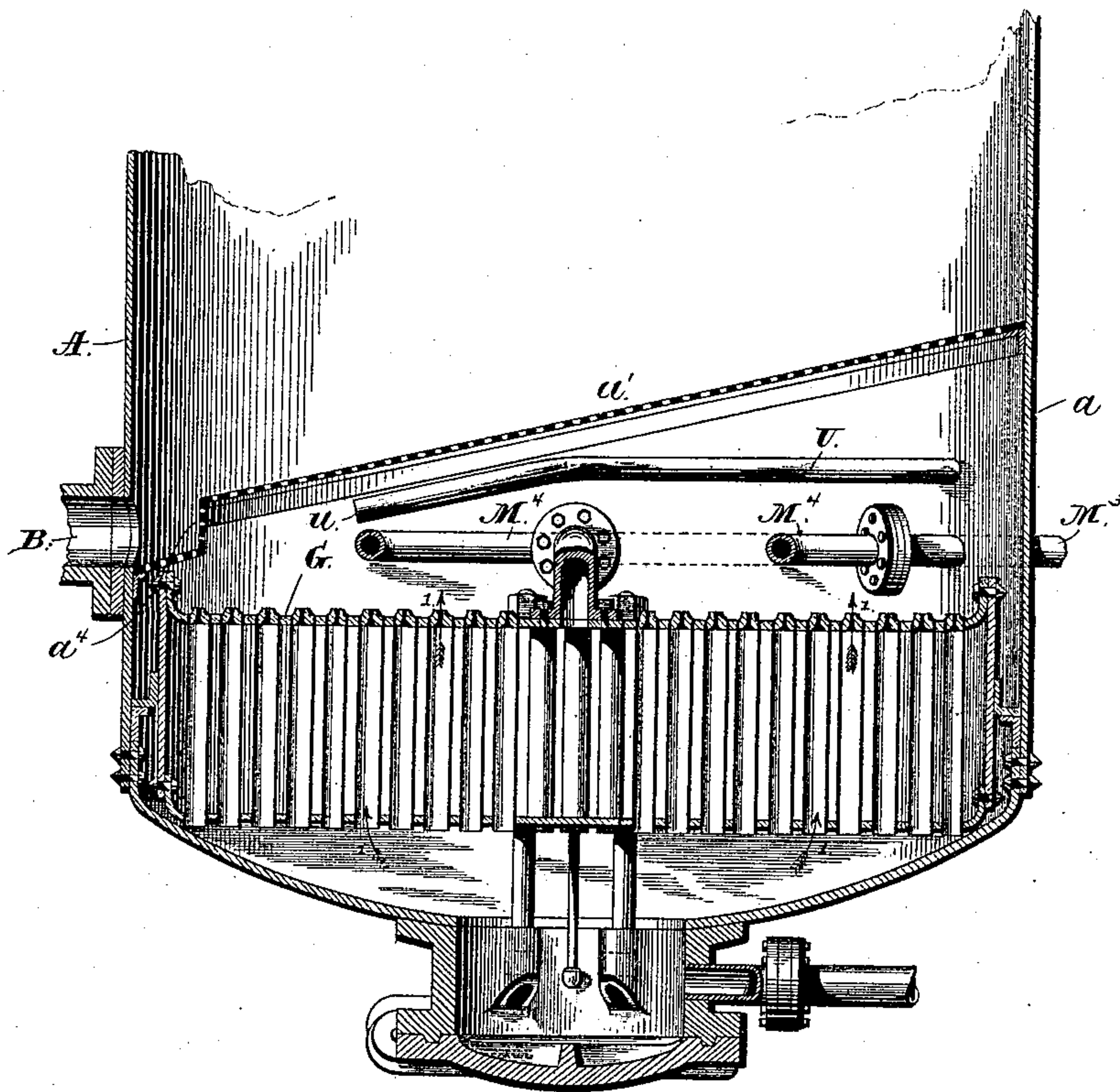
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*Fig. 2.*



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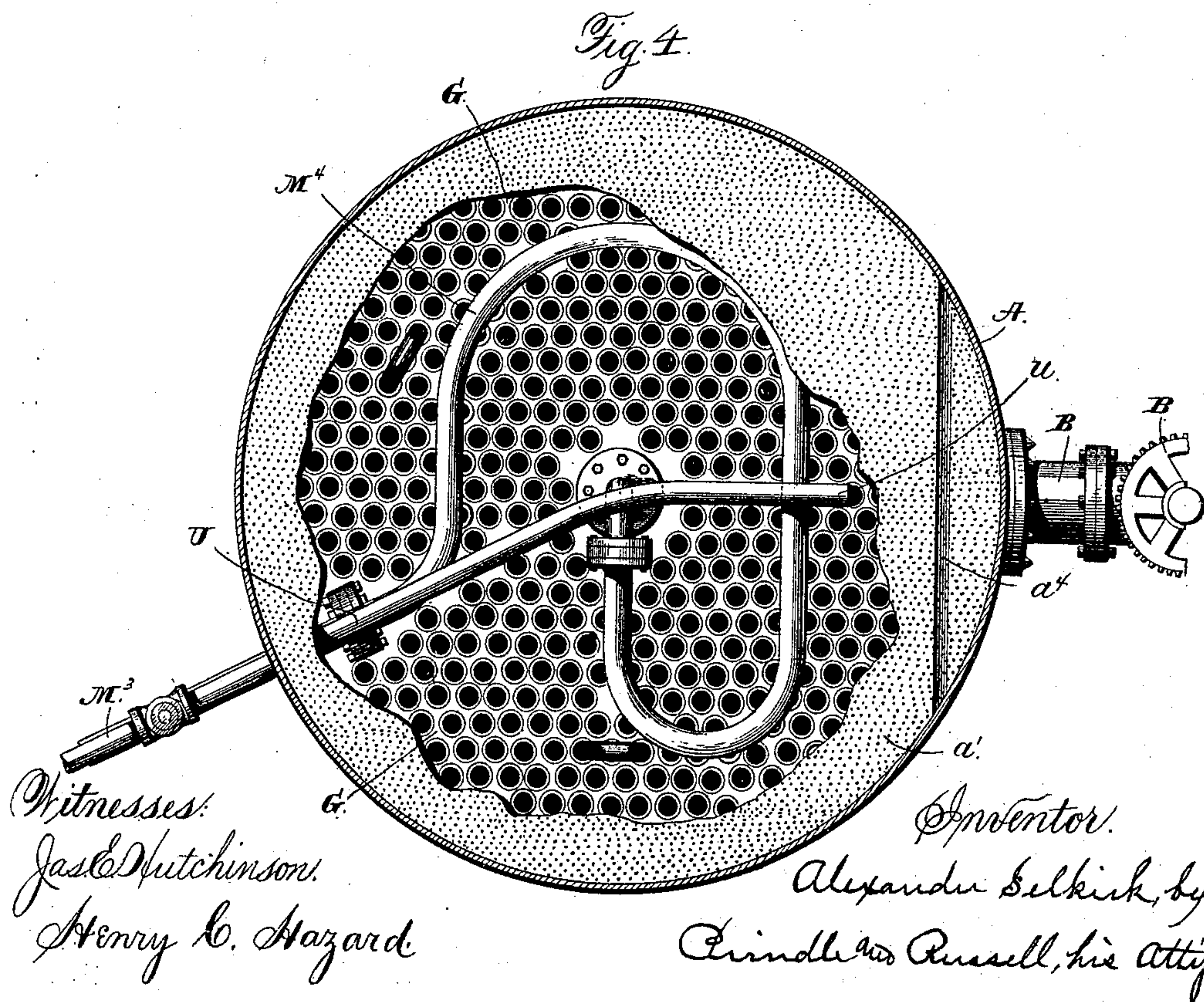
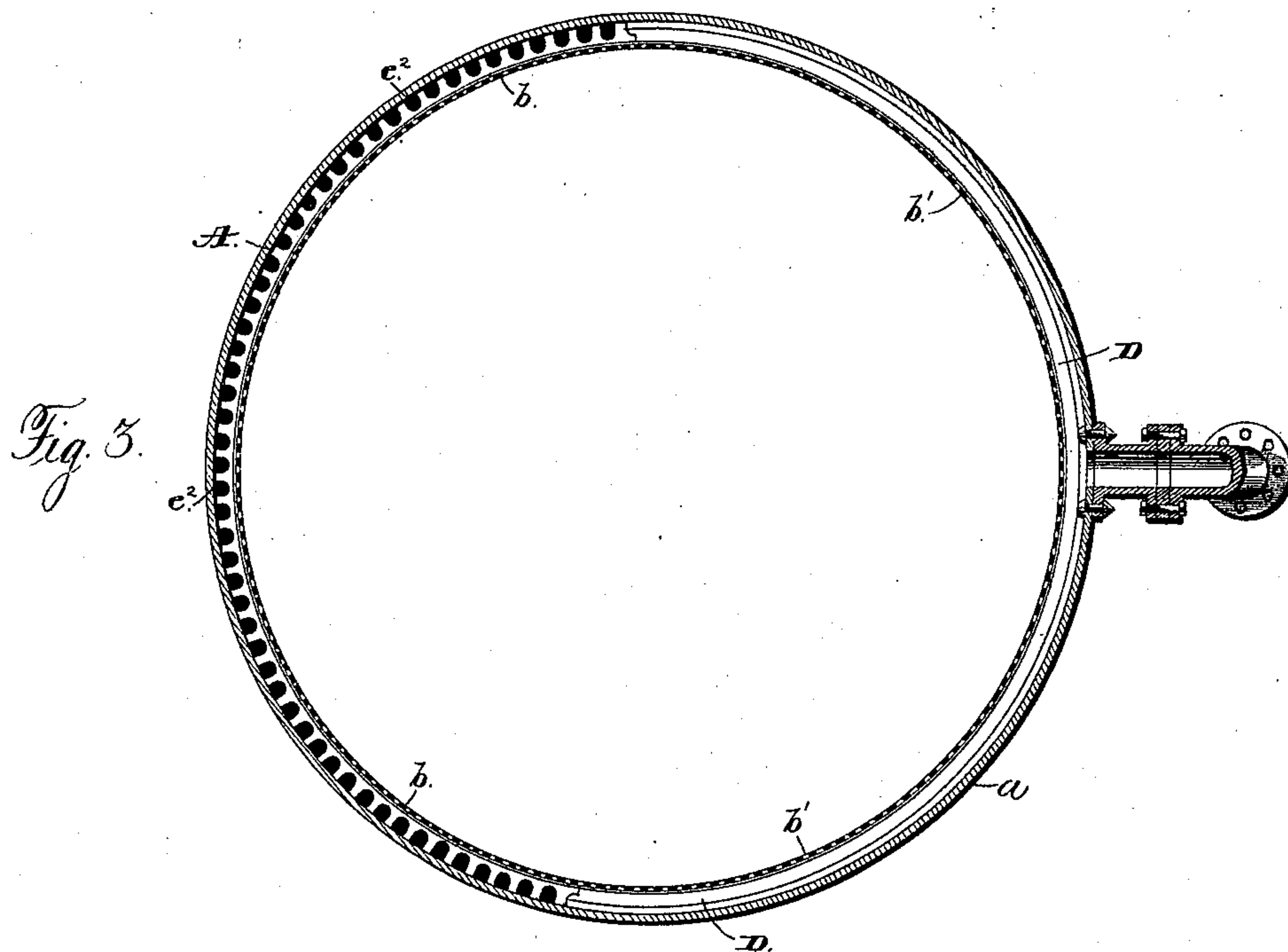
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# UNITED STATES PATENT OFFICE.

ALEXANDER SELKIRK, OF ALBANY, ASSIGNOR, BY MESNE ASSIGNMENTS,  
TO ROBERT WHITEHILL AND DANIEL S. WARING, OF NEWBURG, NEW  
YORK.

## DIGESTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 486,130, dated November 15, 1892.

Application filed March 5, 1889. Serial No. 301,877. (No model.)

*To all whom it may concern:*

Be it known that I, ALEXANDER SELKIRK, a citizen of the United States, residing at Albany, in the county of Albany and State of New York, have invented certain new and useful Improvements in Digesting Apparatus, of which the following is a specification.

My invention relates to digesting apparatus for cooking or reducing vegetable substances to fiber or paper-stock by means of a highly-heated chemical cooking-liquor, and especially to the apparatus described and claimed in application Serial No. 312,749, filed May 31, 1889, for carrying out the process covered in application Serial No. 282,012, filed August 4, 1888.

The invention consists in the construction and combinations of parts hereinafter particularly described, and specifically set forth in the claims.

In the accompanying drawings, Figure 1 is a sectional view of the digesting apparatus. Fig. 2 is a sectional view of the lower portion of the digesting-vessel on an enlarged scale. Fig. 3 is a sectional view on an enlarged scale, taken at line 3 in Fig. 1, with one part of the reinforcing ring-piece broken away. Fig. 4 is a sectional view taken at line 4 in Fig. 1, with the perforated bottom broken away for exposing parts below.

The same letters of reference refer to like parts throughout the several views.

In the drawings is shown in Fig. 1 a digesting apparatus of a similar construction to those described in the applications hereinafter referred to and is provided with the necessary pump and system of pipes to induce the dual circulation therein described and with liquor-heating devices covered in applications Serial Nos. 312,750 and 312,752, filed May 31, 1889. These devices form no part of the invention sought to be covered in this case, and other constructions and arrangements of devices may be substituted for them without changing the operation of the devices herein claimed, and they are shown and will be briefly described solely for the purpose of affording a clear understanding of the construction and operation of the specific improvements hereinafter claimed.

A represents the digesting-vessel, constructed of iron or steel in the usual form and

provided at each end with the ordinary covered manholes or openings, that permit access to be had to the interior. At the ends of the digesting-vessel A are located the liquor-heaters G and Q, of any suitable construction, but preferably that shown, which is a form fully described in application hereinbefore referred to. These heaters have suitable pipe communications—such as pipes M', M<sup>2</sup>, M<sup>3</sup>, M<sup>4</sup>, and M<sup>5</sup>, as shown in Fig. 1—with the main steam-supply pipe M, and are also provided with means for directing through them currents of cooking-liquor.

E is a pump having its discharge-opening connected by a branch pipe with pipes F<sup>2</sup> and J, which are connected, respectively, to the top and bottom of the digester, and conveys liquor to the heaters above referred to. The pipe F is connected at one end to the inlet of the pump and at the opposite end communicates with the interior of the digester at or below the middle portion. By this arrangement of the pipes it follows that when the digester is charged with the material to be treated and filled with liquor to a point above the opening of pipe F and the pump is operated the liquor will be continuously drawn from the interior of the digester and forced in two streams, respectively, into the top and bottom of the digester, and thence through the mass of material forming the charge, being heated in its passage by the heaters G and Q; also, the pipe F is connected to pipes F<sup>2</sup> and J by the pipes I and K and to the top of the digester by pipe F', (shown in dotted lines,) and by means of stop-cocks in each of the pipes the direction of the circulation may be variously changed at the will of the operator. Other arrangements of pipes and liquor-forcing devices may be substituted for those shown, the only essential feature of the construction being that one or more draft-pipes are connected with the digester at or below the middle portion to withdraw the cooking-liquor from the interior of the vessel, said liquor to be subsequently forced back into the digester, thereby producing a dual circulation of the liquor. These matters, being fully described in applications before referred to, need no further explanation.

Inclosed within and concentric with the



wall *a* of the digester and extending for some distance above and below the opening of the pipe F is the perforated plate *d*. This plate is connected to the wall of the digester at top and bottom by the angle-irons *e e*, which are riveted or otherwise firmly secured to each, and this plate *d*, together with the angle-irons and wall *a* of the digester, form an annular liquor-chamber D, which has free communication with the interior of the digester through the perforations in plate *d*, and from whence the liquor may be drawn by pipe or pipes F. The location of pipe or pipes F not only adds to the efficiency of the apparatus by the production of the circulation of the liquor above described, but it also permits by its connection with the side wall the use of a plate *d* of greater area than is possible when the draft-pipe is connected with one or the other of the ends of the digester and when the perforated plate forming the liquor chamber is arranged transversely to the digester, and is therefore limited in size by the size of the vessel. The extended area of plate *d* is of considerable importance, as it permits the liquor to percolate freely through it without exerting too great pressure at any point, and thereby avoids the clogging and bending of the plate, both of which are accidents of frequent occurrence in the former constructions.

In order that the plate *d* may be of sufficient area, and yet be prevented from bending and displacement, there should be provided at intervals open supports between the plate and the wall of the digester, which will sustain the said plate in proper place and condition and permit free communication from all parts of the chamber D to the draft-pipe F. The means I have found convenient for this purpose are shown in Figs. 1 and 3, and consist of a series of rings *e'*, secured by suitable flanges and rivets or equivalent fastenings to the plate *d* and bearing at their edges against the wall of the digester. To permit the necessary circulation of the liquor within the chamber, the outer edges of these rings are formed with notches *e''*, which should be as deep and as close together as possible without impairing the strength of the rings, so that the communication between the various portions of the chamber D may be as free as possible and reduce the liability of clogging. Although the ring form of bracing device is shown to be used for receiving support from the solid wall of the digester, yet this plate *d* can be otherwise supported, as by sections of rings or angle-irons secured by rivets or their equivalents to said plate and bearing against the wall of the digester.

As shown, the inner surface of the plate *d* is covered with wire-gauze *d'*, and the use of this covering is preferred, as it enables the perforations in plate *d* to be of larger size and does not interfere with the passage of the liquor, and yet insures against the passage of any portion of the material forming the charge

into the pipe F—an accident which frequently results in an interference with the proper circulation of the liquor.

At the bottom of the digester and above the heater G is secured the usual perforated plate *a'*, which is suitably secured in place and connected with the wall of the digester. The drawings, Figs. 1 and 2, show this plate to be set inclined and having at its lower dip a perforated step *a''*, which is opposite the blow-off opening B, which opening is provided with a suitable valve B' or stop-cock, as is commonly used for controlling the discharge of the cooked product from the digester.

U is a live-steam-supply pipe from the outside of the digester into the chamber below the perforated inclined plate *a'* and has its discharge end *u* terminating at a short distance rearward of the step *a''*. This pipe U is provided outside the digester with a suitable valve for control of the passage of steam to be discharged from the pipe through the perforations in the step *a''* and into the product at the blow-off opening B when the stop-cock B' is opened and the pressure on the charge of cooked product is forcing the latter downwardly. This steam-pipe will be found to be effective for clearing the product from the inclined plate *a'* as fast as the pressure from above forces the product down on it and prevent the blow-off opening from becoming clogged, as frequently occurs when the charge treated has not been fully reduced.

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

1. In a digesting apparatus, the combination, with the digesting-vessel, of a concentric perforated plate of extended area, forming with the wall of the digesting-vessel an annular liquor-chamber, a draft-pipe leading from said liquor-chamber, and means for forcing the liquor withdrawn from said chamber back into the digester, substantially as described, for the purposes set forth.

2. In a digesting apparatus, the combination, with the digesting-vessel, of a concentric perforated plate forming with the wall of the digesting-vessel an annular liquor-chamber, open supports arranged at intervals between the wall of the vessel and the perforated plate and sustaining the latter in place, a draft-pipe leading from said liquor-chamber, and means for forcing the liquor withdrawn from said chamber back into the digesting-vessel, substantially as described, for the purpose set forth.

3. In a digesting-vessel, the combination, with the wall of the digesting-vessel, of a concentric perforated plate *d*, forming with said wall of said vessel an annular chamber D, the rings *e'*, provided with notches or openings *e''*, a draft-pipe, a pump, and pipes discharging into the respective opposite ends of the digesting-vessel, substantially as and for the purposes set forth.

4. In a digesting apparatus, the combina-



tion, with the concentric internal perforated plate  $d$ , forming with the wall of the digesting-vessel the annular liquor-chamber D, of the wire-gauze covering  $d'$ , a draft-pipe leading from said liquor-chamber, and means for forcing the liquor withdrawn from said chamber back into the digesting-vessel, substantially as described, for the purpose set forth.

5. In a digesting apparatus, the combination, with the digesting-vessel having the blow-off opening provided with a stop-cock controlled by an operator, of the perforated

plate  $a'$ , set inclined and having at its lowest dip the perforated step  $a^4$ , neighboring the blow-off opening, and the live-steam pipe U, having a valve under control of the operator and its discharge end directed to the said step  $a^4$ , substantially as and for the purposes set forth.

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Witnesses:

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