(No Model.) 3 Sheets—Sheet 1.

E. HOLTHAUS.

RENDERING AND DRYING APPARATUS.

No. 539,055. Patented May 14, 1895.

Fig. 1.

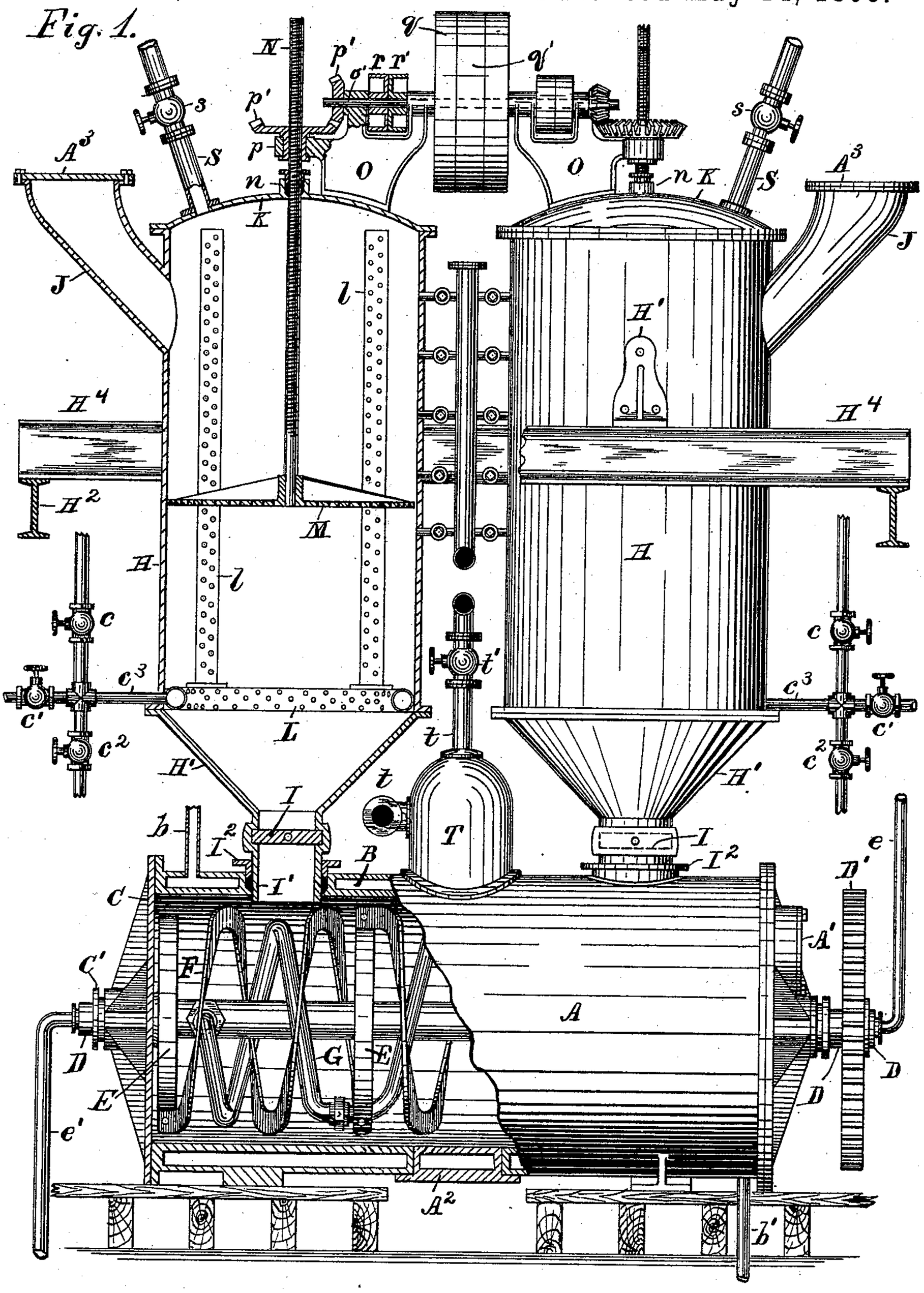

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Fig. 2.

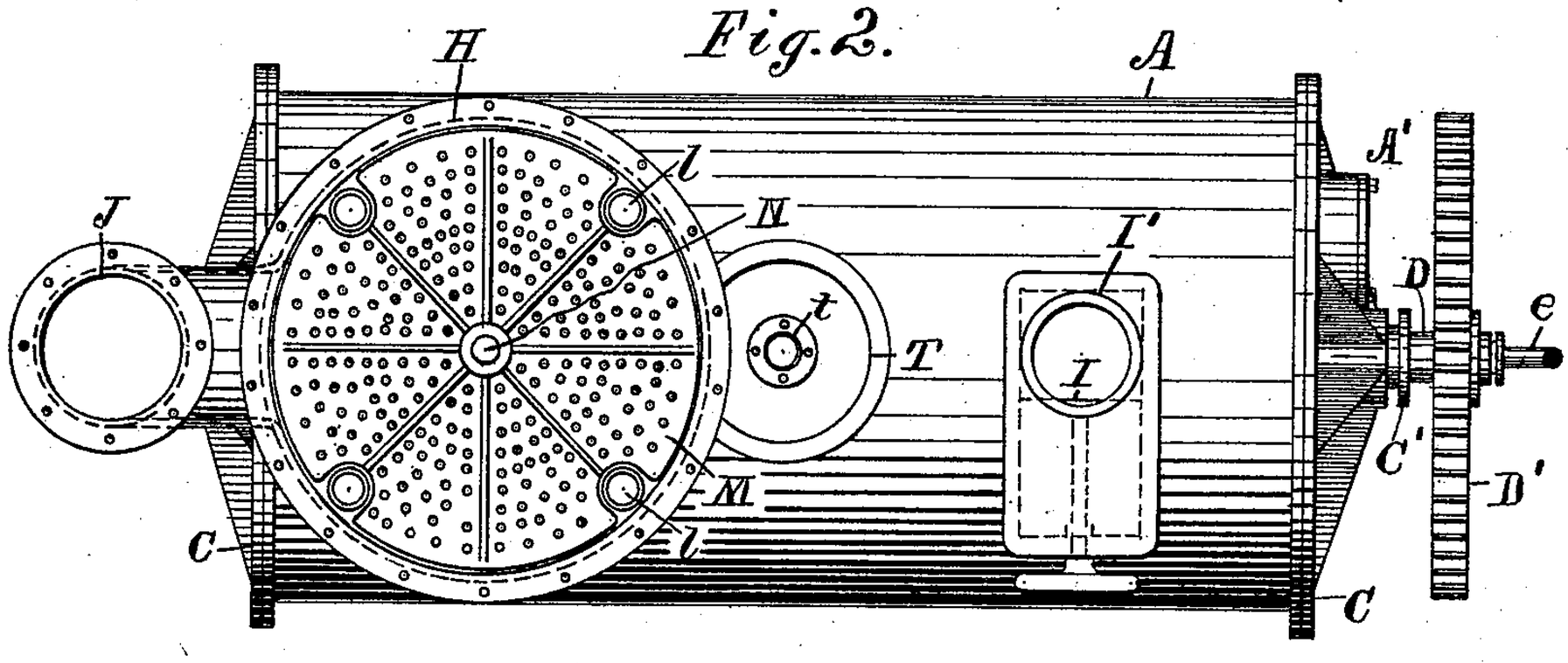


Fig. 6.

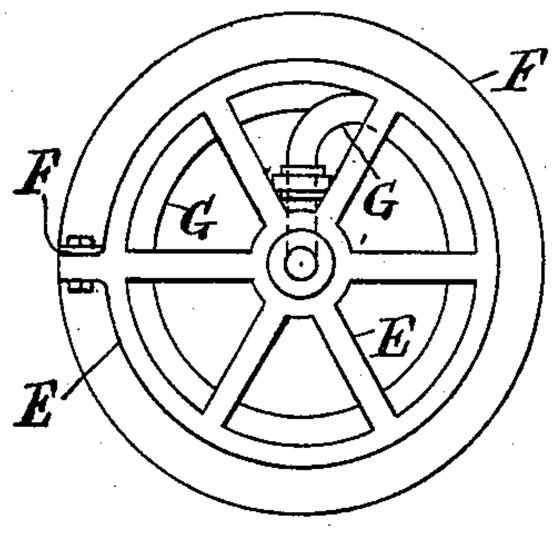


Fig. 3.

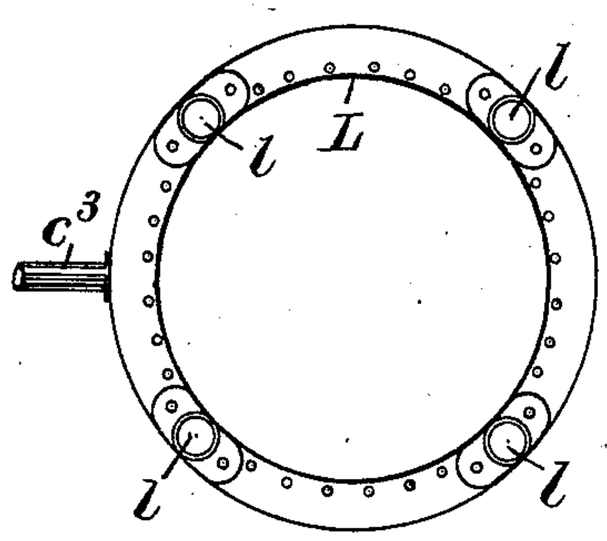
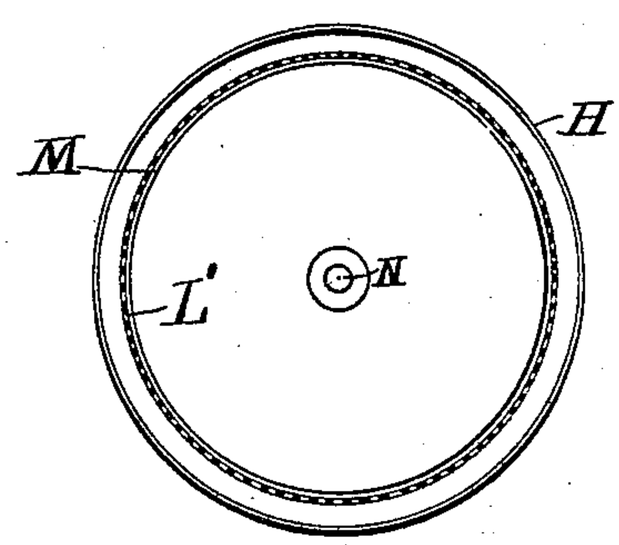


Fig. 5.



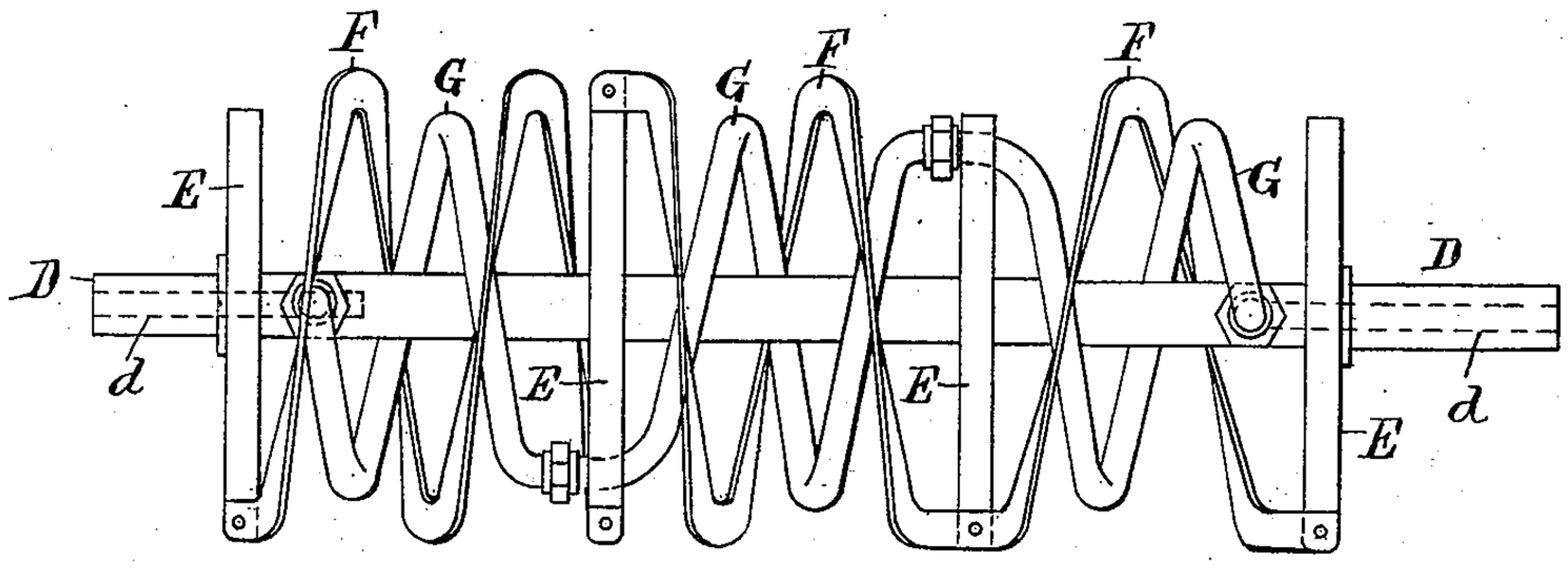


Fig. 4.

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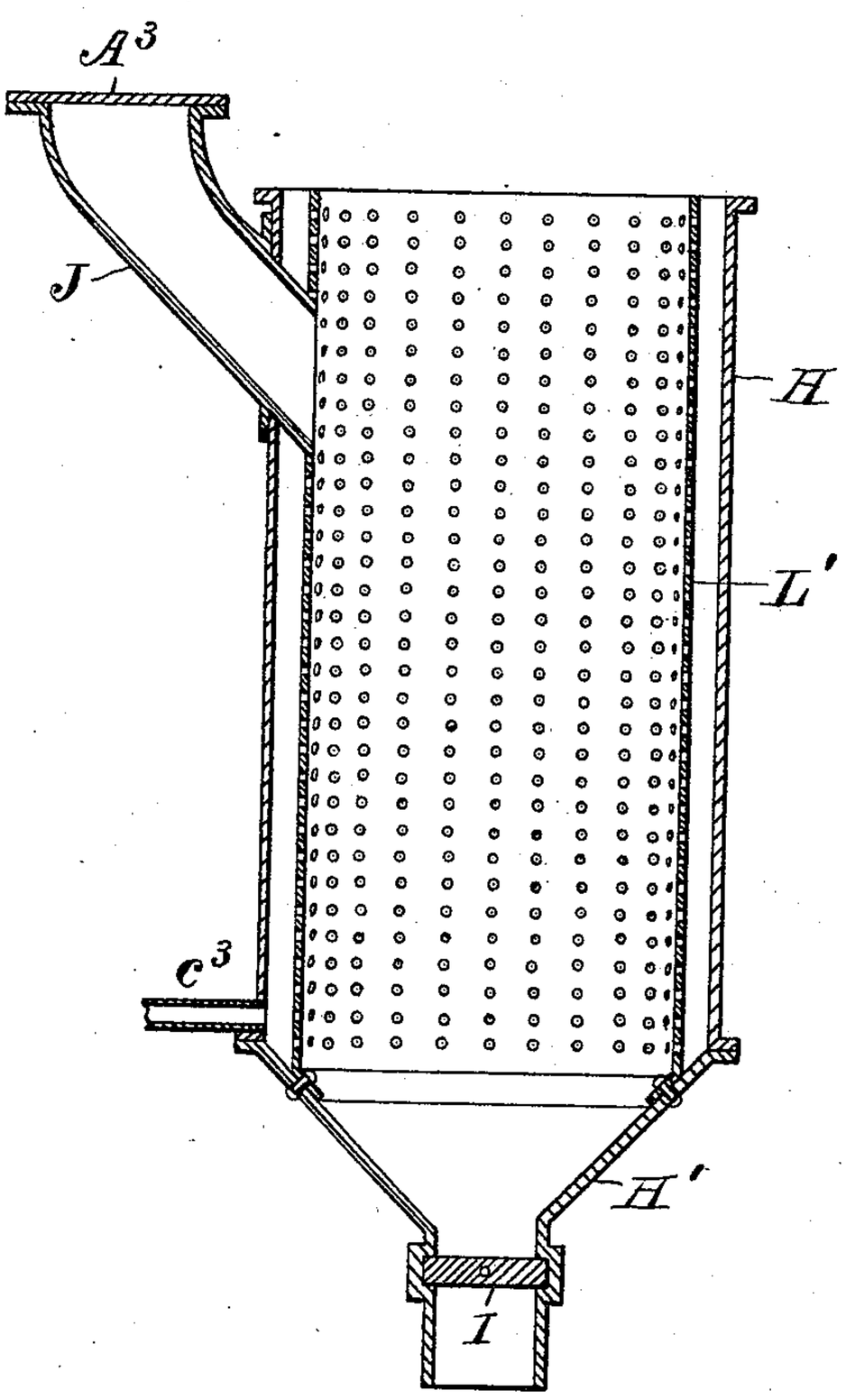
Fig. 7.



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UNITED STATES PATENT OFFICE.

EMIL HOLTHAUS, OF CANARSIE, NEW YORK, ASSIGNOR TO CYRUS C. CURRIER, OF NEWARK, NEW JERSEY.

RENDERING AND DRYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 539,055, dated May 14, 1895.

Application filed December 12, 1894. Serial No. 531,570. (No model.)

To all whom it may concern:

Be it known that I, EMIL HOLTHAUS, a citizen of the United States, residing at Canarsie, Kings county, New York, have invented certain new and useful Improvement in Rendering, Pressing, and Drying of Refuse, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of this invention is to furnish an improved apparatus for rendering offal, garbage, and similar substances, and drying the residue in a continuous operation, so as to recover the grease contained in the garbage and convert the residue into a useful fertilizer.

The invention includes an improved means for discharging the water from the material, and for injecting steam into the material within the rendering tank, and an improved arrangement of the heating pipes and scrapers carried by the rotary shaft of the drying cylinder; also means for compressing the material to discharge the moisture, before drying.

The invention is illustrated in the annexed drawings, in which—

Figure 1 is an elevation of the essential parts of the apparatus, with one end of the drying-cylinder and one of the rendering-tanks shown in section at the center line where hatched. Fig. 2 is a plan of the same with one of the rendering-tanks omitted and the cover removed from the other. Fig. 3 is a plan of the steam-pipes within the rendering-tank, and Fig. 4 is an elevation of the shaft for the drying-cylinder with the heating and stirring appliances attached thereto. Fig. 5 is a cross-section of rendering-tank with perforated inner shell on line 5 3 in Fig. 7. Fig. 6 is an end view of the parts shown in Fig. 4. Fig. 7 is a vertical section of a tank provided with the perforated inner shell L′.

A designates a horizontally disposed drying cylinder formed with surrounding steam shell or jacket B supplied by steam pipe *b* and having a discharge pipe *b′*. Manholes A′ and A² are provided for admission to the drier and for the discharge of the dried contents. The heads C are formed with stuffing boxes C′ through which is extended a shaft D provided at one end with gear D′ through which it may be rotated by suitable means. The shaft is formed in the ends with central passages *d*, one of which is connected with an inlet steam pipe *e* and the other with an outlet pipe *e′*.

Four spiders E are attached to the shaft at its ends and at intermediate points; and a spirally disposed blade F is attached to the spiders and carried around by the shaft close to the interior of the cylinder, so as to thoroughly agitate its contents.

Heating coils G are wound around the shaft in reverse directions in the spaces between the spiders E, and are coupled together to form a continuous steam passage, the ends of which are connected to the passages *d*, thus enabling the steam to circulate through the coils as the shaft revolves.

The stirring blade F is wound spirally in an opposite direction to that of each coil, and as the coils and blade are swept through the material simultaneously, their reverse inclinations prevent the material from accumulating at either end of the cylinder.

Two rendering tanks H are shown suspended by brackets H⁴ and I-beams H² over the drier cylinder A with the outlet I′ from the bottom of each tank extended through a stuffing box I², and provided with a gate I.

A hopper J is connected to the side of each tank near the top just below the cover K, and is closed, after the tank is charged, by a tight flange A³.

A series of outlet pipes *a* with cocks *a′* is inserted at different heights in the side of the tank to draw off the grease to pipe *a²*.

Steam and water may be admitted into the material or withdrawn therefrom by a perforated inner shell L′, shown in Figs. 5 and 7, or by standing pipes *l* shown in Figs. 1, 2 and 3. The pipes *l* are connected at their lower ends within the tank by an annular steam pipe L. The pipes *l* and the shell L′ are formed with numerous perforations, and operate, when steam is admitted to the shell or pipes, to discharge the steam directly into the contents of the tank.

When removing the water from the material at the close of the rendering operation,

the perforations of the shell or pipes form numerous outlets for the escape of the fluid. The standing pipes and the shell are supplied with steam, water, and waste connections, by means of a pipe c^3 which is provided with branches having cocks c, c', c^2, respectively, for such connections.

By the use of a vertical tank having a fixed vertical perforated shell, I am enabled to admit the steam or water, and to draw off the waste water from the material at different points in the vertical height of the mass under treatment, and as the tank is provided with its outlet at the bottom, the material when discharged from such outlet slips past the perforations in the shell without any such obstruction as is experienced when the shell is horizontal and the material is dragged over the same to remove it from the tank.

A piston M is fitted to move vertically in the tank. Where the standing pipes l are used, the piston is formed with notches at its periphery to move over the said pipes, and is provided with a screw rod N which is extended through stuffing box n upon the cover K. When the piston is fully raised it is above the inlet J, and the rod N where it enters the stuffing box at such point is devoid of thread to prevent the escape of vapor.

A bracket O is mounted upon each tank cover to carry a gearing shaft o', and a rotary nut p which, as well as the shaft, is provided with gears p' to raise and lower the piston M. The adjacent ends of the shaft o' are provided with fast pulleys q; a loose pulley q' being mounted between the same upon an extension of one of the shafts. Fast and loose pulleys r, r', smaller than the pulleys q, are also provided upon each shaft. By applying suitable belts to the pulleys q and r either of the nuts p may be rotated at pleasure. The larger pulleys q are used to lower the pistons at a slow rate; while the smaller pulleys r would be used to raise the pistons at a quicker rate.

A pipe S with cock s is provided at the top of each tank to discharge the fumes to a suitable condenser, and when desired to a furnace for consuming the gases.

The process of treating garbage in the apparatus is as follows: The piston M being raised to the top of each tank, one of the tanks H is charged with garbage and a weak solution (as one per cent.) of mineral acid, and the hopper is tightly closed by the flange A^8. A suitable proportion of water is then introduced through the cock c' into the pipes L and l, or perforated shell L', if such be used, and the water cock is then closed and the steam cock c opened, which injects steam into the garbage from the bottom of the mass and from all sides of the same. The garbage is then cooked with steam for a suitable time, as four or five hours, to thoroughly extract the grease; the vapors being drawn off through the pipe S and condensed during such treatment. The grease which rises during such operation to the surface of the mass is drawn off through the appropriate pipe a, and about an hour before the close of the cooking operation the steam cock c is closed, the waste cock c^2 is opened, and the piston M is forced slowly downward upon the mass, to press out all the superfluous moisture. The water thus expressed enters the holes in the pipes L and l, or perforated shell L', if such be used, and is discharged from the cock c^2 to a suitable receptacle, from whence it may be pumped into a succeeding charge through the cock c'. The material valuable for fertilizing purposes which would otherwise be lost in the extracted fluid is thus returned to the succeeding charge. The perforated shell or stand pipes operate during the pressing operation to discharge the fluid which is pressed from the material beneath the piston, and they also furnish a free outlet for the water which passes above the piston, in whatever position the piston may be moved. When the water is suitably expressed from the material, the gate I is opened beneath the said tank and the contents discharged into the drying cylinder A, where it is continuously stirred for about an hour, when it is ready for discharge from the manhole A^2. During such drying operation, the fumes which are generated by the heat are discharged from the drier through the dome T, which is provided with suitable outlet pipes t which would be provided with cocks t' for connection with a condenser or furnace for consuming gases. The material in the drying cylinder is not only heated by the steam circulated in the jacket B, but also by contact with the heating pipes or coils G, which are constantly moved through the material with the blade or scraper F attached to the shaft D. The material is thus rapidly heated and dried; while the escape of all noxious fumes is avoided by condensing or burning the same.

To use the series of rendering tanks H in connection with the single drier A, the tanks are charged alternately at regular intervals, and are kept in operation simultaneously, so that their contents may be in readiness for discharge to the drier alternately, the gates I serving to retain the material in the tanks during the rendering operation, and to connect the tanks in succession with the same drier. The treatment of the material within each of the rendering tanks would be as just described.

It is obvious that clutch pulleys may be applied to the gearing shafts o'.

The apparatus may be used in the treatment of any material which requires the extraction of grease and thorough drying of the residue.

By connecting the space within the perforated shell L' with steam and water connections, a pressure of water or steam may be thrown into the space outside of the shell and operate (when required) to clean out any of the holes which may become clogged with the material.

The perforated shell L′ is especially effective in distributing, through the material to be treated, the steam which is required in the cooking operation, and I have therefore made a special claim to the same.

No claim is made herein to the annular steam pipe L and perforated standing pipes *l*, with their steam and water connections, as they are claimed in my Patent No. 507,222, granted October 24, 1893, for improvements in rendering tanks.

I have not claimed herein an apparatus having two or more separate rendering tanks arranged above a single drying cylinder with their outlets connected thereto, so as to dry the material successively from such series of rendering tanks; nor an apparatus having the rendering tanks supported independently of the drying cylinder and connected thereto by expansion joints; but I have on the 20th of April, 1895, filed a second application therefor, Serial No. 546,478, marked Division B, of this application.

Having thus set forth the nature of my invention, what I claim herein is—

1. In an apparatus for treating garbage, the vertical rendering tank H having discharge outlet I′ for the residue of the material at the bottom, the perforated shell L′ projected upward from the bottom within the wall of the tank with intervening space for the circulation of steam and water, means for supplying the material at the top of the tank, and water and steam connections to the intervening space about the perforated shell, the whole arranged substantially as set forth.

2. In an apparatus for treating garbage, a rendering tank having cover K provided with stuffing box *n*, the tightly closed inlet J beneath the same, the perforated shell L′, the perforated piston M with rod N extended through the stuffing box, means for depressing the rod, and a series of grease pipes and cocks at different heights upon the tank, as herein set forth.

3. In an apparatus for treating garbage, a rendering tank having cover K provided with stuffing box *n*, the tightly closed inlet J beneath the same, the perforated shell L′, the perforated piston M with screw rod N extended through the stuffing box *n*, the rotary nut *p* with suitable support and gearing to turn the same in reverse directions, steam and water connections to the pipes *l*, and the series of grease pipes *a* at different heights upon the tank, as set forth.

4. In an apparatus for treating garbage, a drier comprising a horizontal cylinder having heads provided with stuffing boxes, the shaft D extended through the same and having passages *d* connected with the steam pipes *e*, *e′*, a steam coil G wound about the shaft and connected with the passages *d*, and the blade or scraper F wound about the shaft in the opposite direction, as and for the purpose set forth.

5. In an apparatus for treating garbage, a drier comprising a horizontal cylinder having heads provided with stuffing boxes, the shaft D extended through the same and having passages *d* connected with the steam pipes *e*, *e′*, the series of spiders E upon the shaft, the series of coils G wound about the shaft in reverse direction between the spiders, and connected in series with the passages *d*, and the series of blades or scrapers F attached to the spiders and wound reversely to the adjacent coils, as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EMIL HOLTHAUS.

Witnesses:
EDW. F. KINSEY,
THOMAS S. CRANE.