

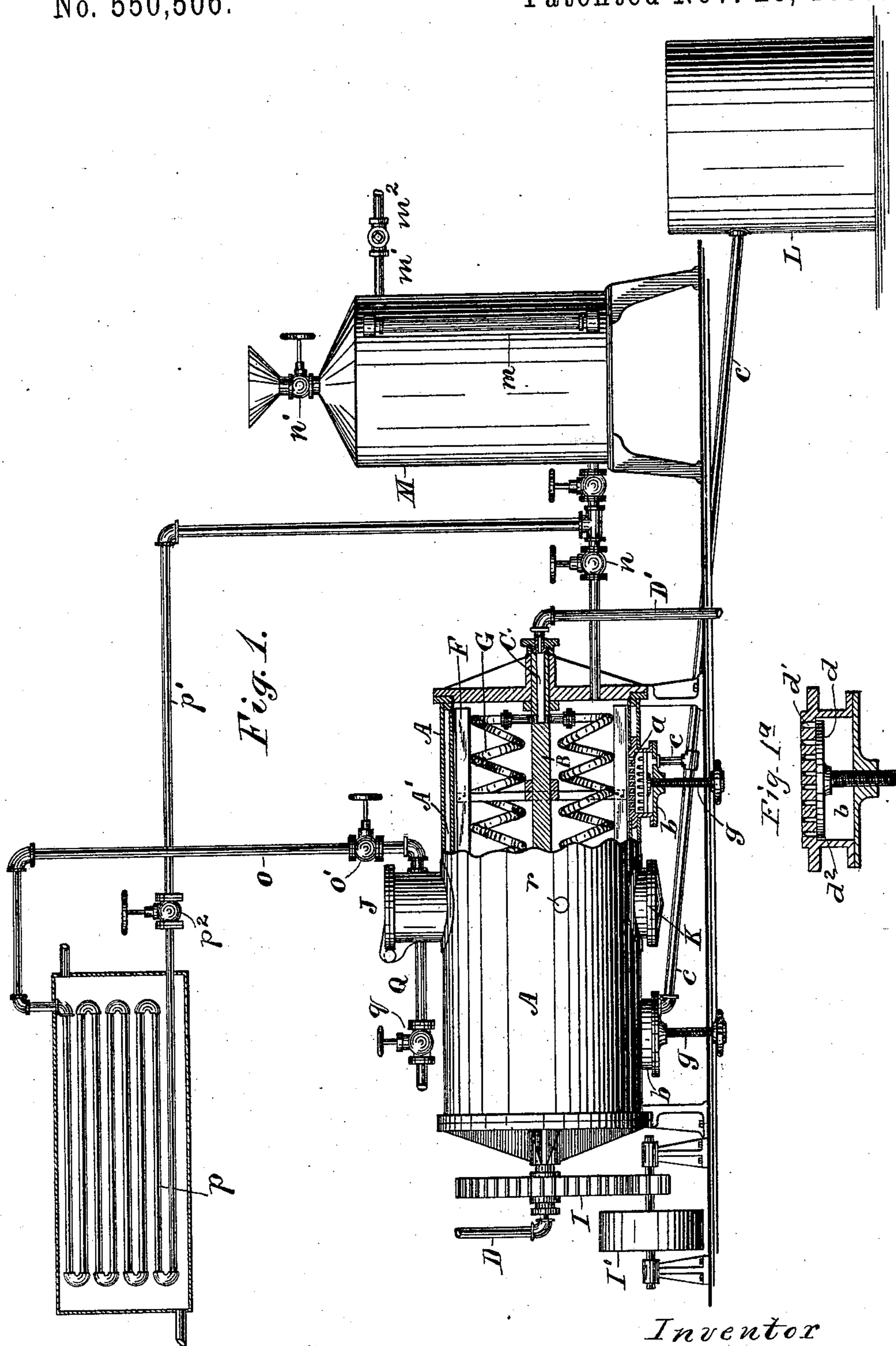
(No Model.)

2 Sheets—Sheet 1

E. HOLTHAUS.
DRIER AND EXTRACTOR FOR REFUSE.

No. 550,506.

Patented Nov. 26, 1895.



Attest:
L. Lee.
Edw. F. Ramsey.

Inventor
Emil Holthaus
per Thos. S. Crane, Atty.

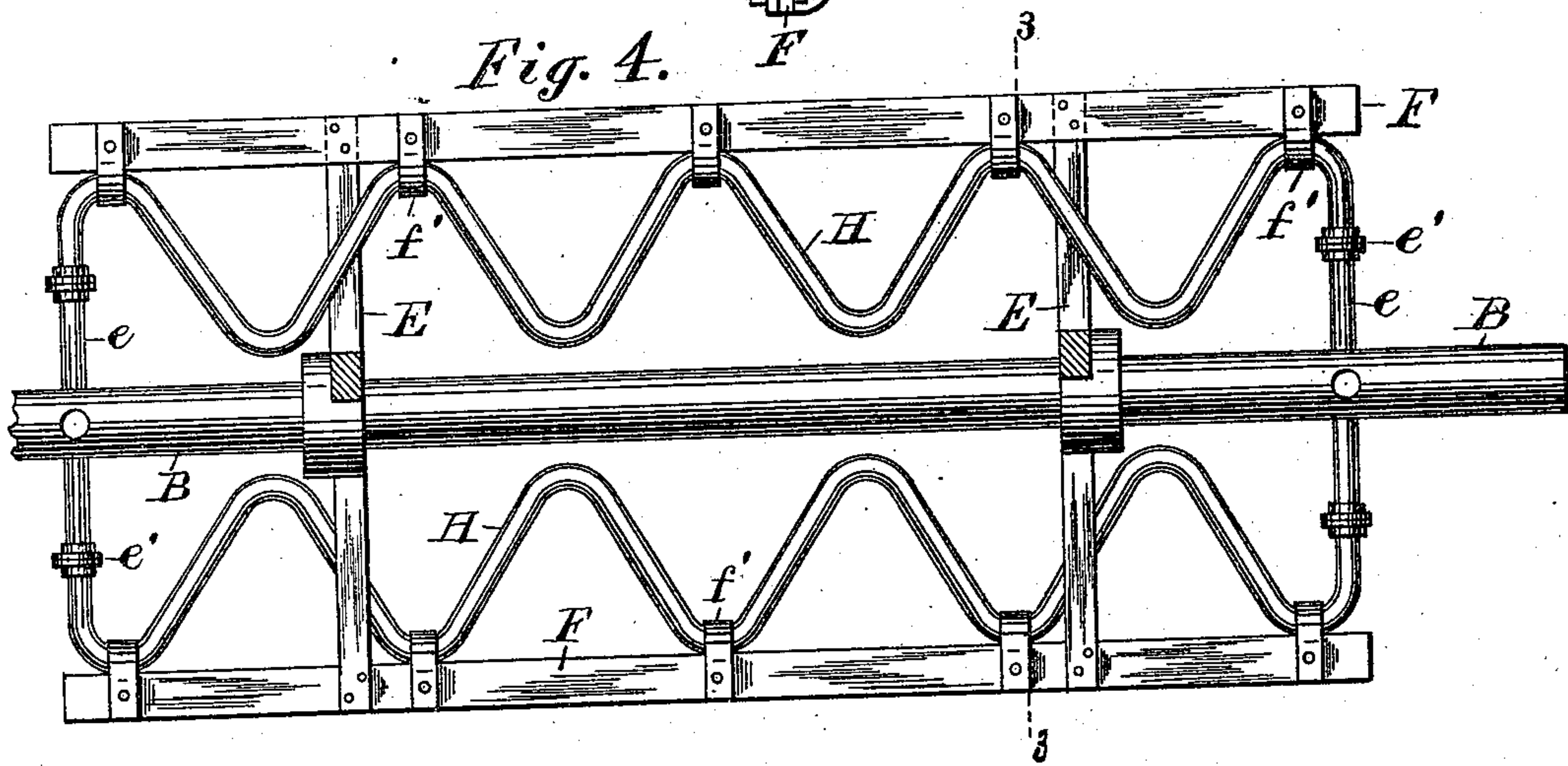
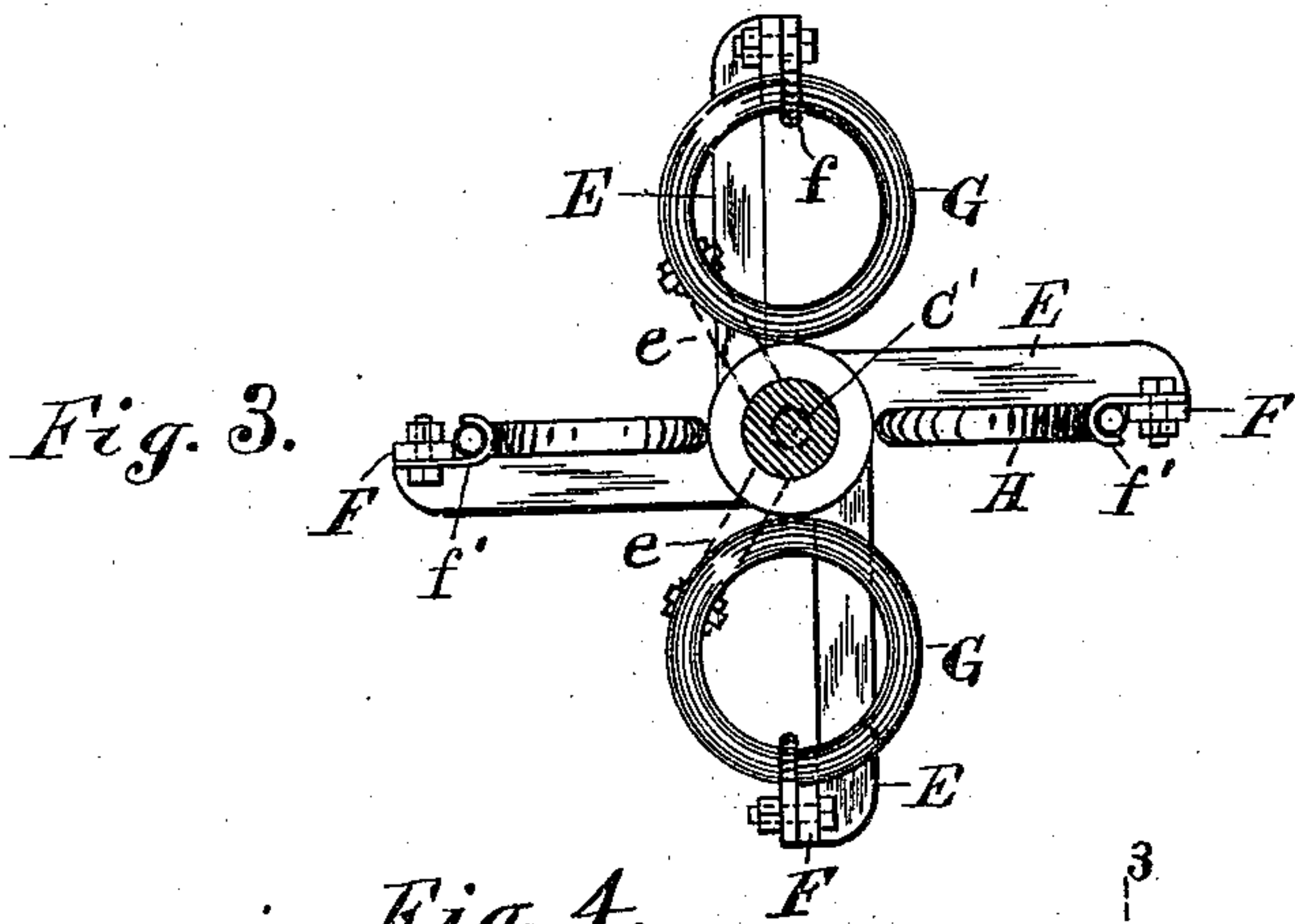
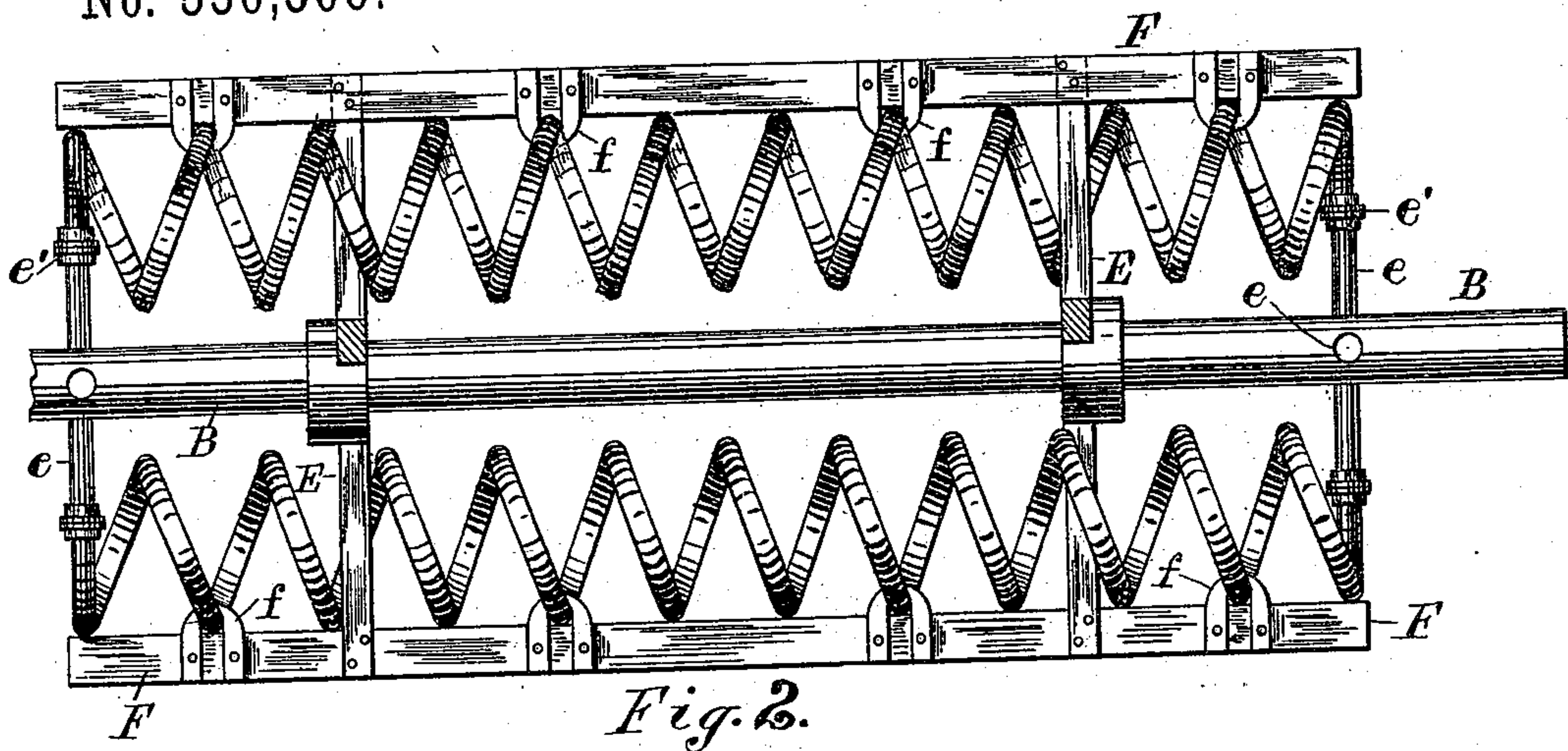
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2 Sheets—Sheet 2.

E. HOLTHAUS.
DRIER AND EXTRACTOR FOR REFUSE.

No. 550,506.

Patented Nov. 26, 1895.



Attest:
L. Lee.
Edw. J. Kinsey

Inventor
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Thos. S. Crane, Atty.

UNITED STATES PATENT OFFICE.

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

DRIER AND EXTRACTOR FOR REFUSE.

SPECIFICATION forming part of Letters Patent No. 550,506, dated November 26, 1895.

Application filed March 6, 1895. Serial No. 540,694. (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 Improvements in Driers and Extractors for Refuse, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 The present invention relates to improved means for heating the material in a horizontal cylindrical drier, to improved means for discharging the grease therefrom, to improved means for operating the drier when rendering the garbage in contact with naphtha or other volatile solvent, and to details of construction, as hereinafter set forth and claimed.

15 These improvements will be understood from the following description, with reference to the annexed drawings, in which—

20 Figure 1 is a side elevation of the apparatus with one end of the drier broken away to the center line, where hatched and the casing of the surface condenser also broken away to expose the inclosed coil. Fig. 1^a is an enlarged section of the drier outlet-valve. Fig. 2 is a side elevation of the stirring device, showing the coils, but having the zigzag pipes and their supporting-arms removed. Fig. 3 is a cross-section of the entire stirring device, taken on line 2 2 in Fig. 4; and Fig. 4 is a side elevation of the stirring device, showing the zigzag pipes, but having the coils and their supporting parts removed.

35 The drier is formed as a horizontal cylinder A, having steam-jacket A', and with a shaft B extended through the cylinder and having in the ends passages C C' connected, respectively, with steam-inlet pipe D and steam-outlet pipe D'. Arms E are attached to the shaft-carrying scrapers F, and radial pipes e, having couplings e', are inserted in the shaft near the ends in connection with the passages C C'. Reversely-wound coils G are shown upon opposite sides of the shaft, with their ends connected to the coupling-pipes e, the coils being also attached to the scrapers F by clips f. Zigzag pipes H are shown, extended upon opposite sides of the

shaft intermediate to the coils and connected with the passages C C' by coupling-pipes e. The outer bends of the pipes are tied to the adjacent scrapers by clips, which serve to hold the coil-pipes and zigzag pipes securely when carried through the material in the drying-cylinder by the rotation of the shaft. The passages C and C' are wholly independent of one another, so that the steam can pass from one to the other only by circulating through the heating-pipes G or H. Such pipes are therefore extended from one of the passages to the other with the opposite ends of the pipes connected, respectively, to the said passages, by which construction a positive circulation of the steam through each of the coils or zigzag pipes is effected. The zigzag pipes agitate the material without shifting the same endwise in the cylinder; but the spiral form of the coils G operates to push the material gradually toward the end of the cylinder. The coils upon the opposite sides of the shaft B are preferably wound in reverse directions, as indicated by the arrows s and s' in Fig. 3. Gears I and pulley I' are shown to rotate the shaft when desired. The cylinder is shown with top manhole J to introduce the material and bottom manhole K to discharge the same, and the bottom of the cylinder is furnished with one or more outlet-plates a, perforated with straight holes and inclosed with a casing b, having an outlet-pipe c. A plunger d, provided with pins d' to fit the perforations in the outlet-plate, is movable by means of screw g to and from the plate within the chamber formed by the casing and forms an outlet-valve for the grease. The plunger, as shown in Fig. 1^a, is held from turning by guides d², and is fitted loosely to the chamber to permit the fluid which passes through the perforated plate to escape by the pipe c.

The pins d' are made parallel and thus adapted to wholly fill the straight holes in the outlet-plate a and thus operate to completely push from the holes any matter that is crowded into the same from the cylinder while the holes are open. When the valve is closed by pressing the plunger toward the plate a, the pins fill the holes and thus prevent the

scrapers F from crowding the material into the holes and thus clogging them while the valve is closed. By this construction the holes are fully opened when the plunger is retracted to discharge the grease.

The outlet-pipes *c* are extended to a grease-tank L.

A naphtha-tank M, provided with a sight-gage *m*, is connected with the drier-cylinder by pipe having cock *n*. A pipe *m*, with cock *m*², is fitted to the top of the naphtha-tank to introduce air under pressure, and a filling-cock *n*¹ is provided on the top of the tank. A scale may be applied to the sight-gage. The top of the cylinder is connected by a pipe *o*, having cock *o*¹ with one end of the coil *p* of a surface condenser, the opposite end of the coil being connected with the naphtha-tank by pipe *p*¹ with cock *p*². The top of the drier is provided with a pipe Q, having cock *q* to connect with a jet-condenser. A test-hole *r* with suitable plug is provided to withdraw a sample of the contents.

The operation of the apparatus is as follows: A charge of the garbage is inserted in the drier through manhole J and all the cocks and outlets closed, excepting the cock *q*, which connects with the jet-condenser. As there is no connection between the pipes D and D', except through the coils G and pipes H, the steam is positively circulated through the coiled and zigzag pipes, and the shaft is revolved, carrying the pipes through the material with the stirrer-blades, thus not only agitating the material, but bringing every portion into contact with the heated surfaces of the pipes. The moisture discharged from the material is carried through the pipe Q to a jet-condenser and its discharge into the atmosphere is thus avoided. When the material is dry, which may be determined by drawing a sample from a test-hole, the condenser connection is closed and the naphtha-tank M is opened. Air under pressure is introduced to the naphtha-tank by the pipe *m*¹ and a suitable charge of solvent is forced by such air-pressure into the drier-cylinder. The cock *n* is then closed and the receptacle heated by the steam of the jacket A' and pipes G and H until a pressure of about twenty pounds above the atmosphere is attained, thus digesting the refuse with the naphtha and dissolving the grease as desired. Such pressure produces a suitable temperature in practice to operate most effectively with the naphtha vapors in extracting the grease from animal matters. The plungers *d* are then withdrawn by the screws *g* from the plates *a*, thus withdrawing the pins *d*¹ from the perforations in the plates and discharging the grease into the chambers *b*, from whence it flows to the grease-tank L. When the grease is flowing from the cylinder A, the perforations are liable to become clogged, and the pins *d*¹ are provided to cleanse such openings by their penetration into the same each time the valve is used. The pins, by their

parallel form, operate to completely dislodge the material from the straight holes in the plates. A free discharge of the grease is thus secured whenever the plunger is retracted. The grease-outlet being then closed the cock *o*¹ to the surface condenser is opened and the naphtha, by the heat of the cylinder, is distilled to the surface condenser, from whence it is discharged to the naphtha-tank. By examining a sample from the test-hole the operator may determine whether the grease is wholly extracted, and if not the cock *o*¹ is closed and a charge of naphtha is again injected into the drier-cylinder through cock *n* and the material digested with the same and the grease withdrawn, as before. The naphtha is again vaporized, condensed, and returned to the naphtha-tank, and such treatment with the naphtha, benzine, or other volatile solvent may be repeated as often as is necessary to wholly extract the grease from the material.

From the above description it will be understood that the moisture is wholly discharged from the material and the refuse thus completely dried before treatment with the solvent, which secures a much more effective operation for the volatile solvent than when mixed with wet material. A smaller amount of solvent is required to effect the discharge of the grease and a smaller amount of time is required for its operation than when mixed with water, as in the treatment of wet refuse.

By means of the coiled and zigzag pipes, which are carried through the material with the scrapers, the material is also heated with far greater rapidity and the steam for heating used with much higher efficiency than where it is used exclusively in a steam-jacket, which operates only upon the exterior of the mass.

The coiled pipes being carried wholly at the side of the shaft are brought into contact with the material much more effectively than when coiled around the shaft, as in my Patent No. 533,896, dated February 12, 1895, and have less tendency to crowd the material to one end of the cylinder. I am thus enabled by the use of coiled and zigzag pipes to secure a longer passage for the steam and a greater amount of heated surface to move through the material than when the pipes are wound around the shaft in a single spiral coil.

I am aware that in a distilling apparatus a series of tapering pins have been used in connection with an adjustable plate for shifting the same simultaneously to vary the apertures in a series of crowded inlets by introducing the pins more or less into such inlets. In such construction the perforated plate has been formed with holes of tapering form contracted toward the side where the pins are inserted, but it is obvious that such a form for the holes and pins could not be used in the clearing device which is applied to my grease-outlet valves.

If the holes were expanded upwardly in my

outlet-plate *a*, the refuse in the drying-cylinder would crowd into such holes with especial force and tapering pins would not be able to dislodge the material therefrom, and the holes, therefore, require to be straight in my construction and the pins of parallel form, so as to wholly prevent the introduction of material to the holes when the pins are therein and to effectually dislodge the material when the pins are forced into the holes.

It is evident that the arms *E* serve as supports to carry the scrapers *F*, and any form of support which performs the same function would obviously be equivalent to the said arms. In my copending application, Serial No. 525,062, filed October 6, 1894, for patent on apparatus for treating garbage I have shown circular disks attached to the shaft to support the scrapers, and such disks would be an equivalent for the arms in the present construction if apertures were provided to admit the zigzag pipes or coil-pipes through the disks where required.

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

1. In an apparatus for treating garbage, the combination, with a horizontal drying cylinder having a rotating shaft carrying scrapers adjacent to the wall of the cylinder, of the outlet plate *a* affixed in the bottom of the cylinder and perforated with a series of straight holes, the casing *b* inclosing the same and having an outlet *c*, the plunger *d* provided with the parallel pins *d'* to fit the perforations in the outlet plate, and means for moving the plunger to and from the plate, the plunger being adapted to close the outlet holes, and the pins operating to prevent the material from entering the holes when thus closed, and to dislodge the material from the holes when required, the whole arranged and operated as and for the purpose set forth.

2. In an apparatus for treating garbage, the combination, with a horizontal drying cylinder having the shaft *B'* extended through the cylinder, and provided with disconnected passages *C* and *C'* in its opposite ends, and with supports or arms having scrapers attached to the same in proximity to the wall of the cylinder, of a series of spirally coiled pipes extended from end to end of the cylinder at the sides of the shaft, and fastened to the scrapers as by clips *f*, with the opposite ends of the said coils connected respectively to the pas-

sages *C* and *C'*, substantially as herein set forth.

3. In an apparatus for treating garbage, a drier comprising a horizontal cylinder having the shaft *B* extended through the cylinder and having passages connected with steam inlet and outlet, arms carrying the scrapers with the shaft, and a series of reversely wound coils carried each at one side of the shaft, between the shaft and scrapers, and connected with said steam inlet and outlet, as and for the purpose set forth.

4. In an apparatus for treating garbage, a drier comprising a horizontal cylinder having the shaft *B* extended through the cylinder and having passages connected with the steam pipes *e*, the arms *E* carrying the scrapers *F*, the reversely wound coil pipes, at opposite sides of the shaft, and the zigzag pipes carried by the shaft intermediate to the coils, the said pipes being connected with the passages in the shaft, as and for the purpose set forth.

5. In an apparatus for treating garbage, a drier comprising a horizontal cylinder having the shaft extended through the cylinder, and formed with steam inlet and outlet passages, the radial pipes *e* connected with such passages, and a series of spirally coiled heating pipes carried by the shaft, each at one side of the same, with its ends coupled to the pipes *e*, as and for the purpose set forth.

6. In a drier and extractor for refuse, an apparatus comprising a horizontal drying cylinder with shaft extended through the same and provided with scrapers, steam inlet and outlet at the ends of such shaft, heating pipes carried by the shaft and connected with such inlet and outlet, valves at the bottom of the cylinder for discharging the grease, outlets at the top with connections for jet and surface condensers, a naphtha tank having connection to the cylinder and to the surface condenser, and a pipe for supplying compressed air to the upper part of the naphtha tank, the whole arranged and operated substantially as herein set forth.

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

EMIL HOLTHAUS.

Witnesses:

THOMAS S. CRANE,
L. LEE.