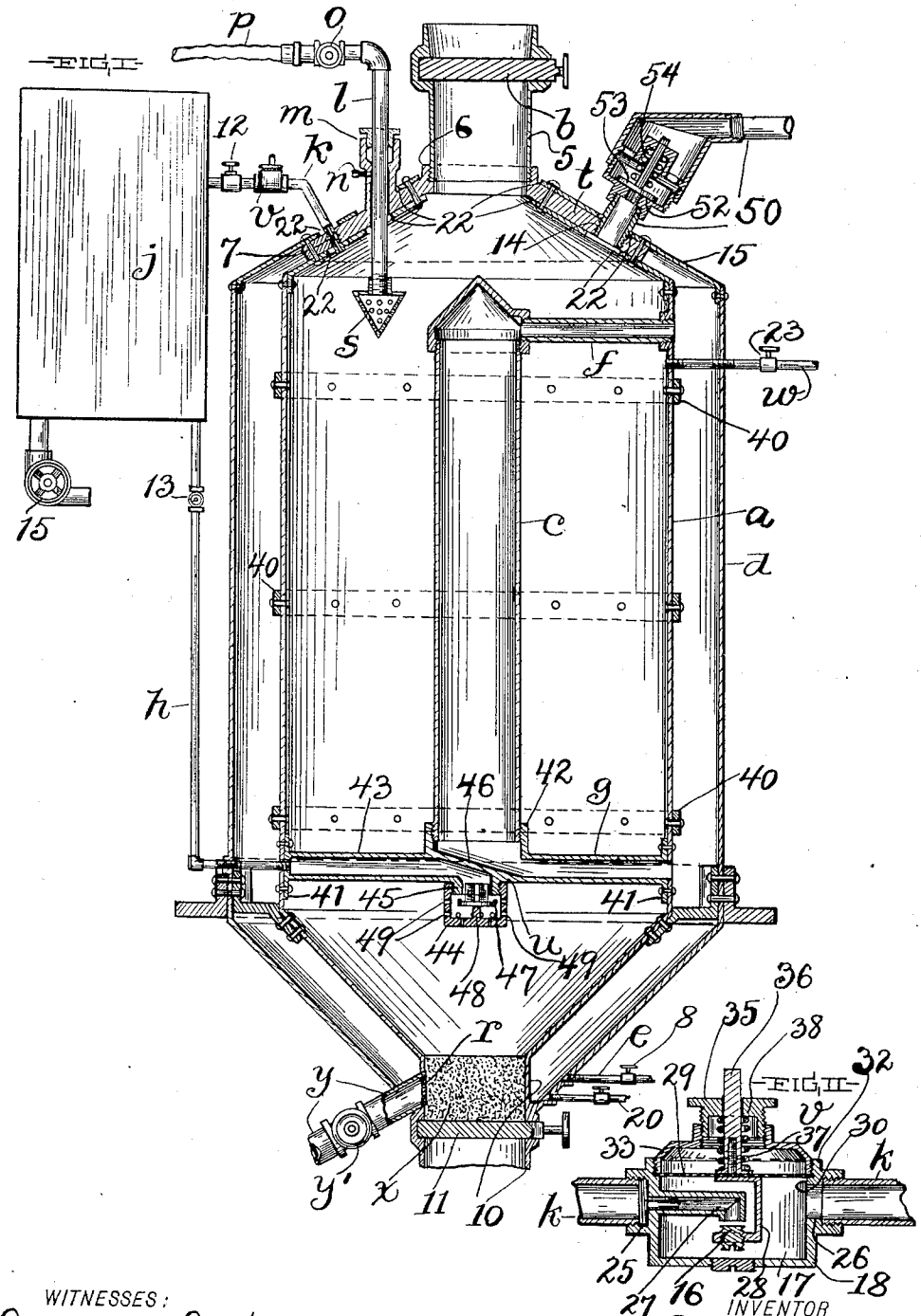
No. 707,567. Patented Aug. 26, 1902.

E. R. EDSON.

RENDERING APPARATUS.

(Application filed Mar. 31, 1902.)

(No Model.)



WITNESSES:

David E. Daly.

G. M. Hayes.

INVENTOR

Eugene R. Edson

BY

Spencer Dorr

his ATTORNEYS

UNITED STATES PATENT OFFICE.

EUGENE R. EDSON, OF CLEVELAND, OHIO.

RENDERING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 707,567, dated August 26, 1902.

Application filed March 31, 1902. Serial No. 100,751. (No model.)

To all whom it may concern:

Be it known that I, EUGENE R. EDSON, a citizen of the United States of America, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Rendering Apparatus; and I hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to improvements in apparatus for rendering or reducing fish waste or fish and other material capable of yielding oil or gelatin or both oil and gelatin.

The primary object of this invention is to provide apparatus well adapted for extracting gelatin-yieldable liquid and oil from material of the character indicated rapidly and thoroughly and comprising the following: a closed receptacle wherein the material is heated, means for subjecting the material during its treatment within the receptacle to a pneumatic pressure greater than the pressure which results from the heating of the material, and means for introducing into the receptacle, when the mass within the receptacle has caked or become so closely packed as to obstruct or retard the flow of oil or liquid extracted from the solid particles of the mass, air or aeriform or gaseous fluid under a pressure greater than the first-mentioned pressure, so as to result in a disintegration of the mass, and consequently in a separation of the solid particles of the mass, and thereby permit and facilitate the flow of the liquid product or products from the material undergoing treatment.

With this object in view, and to the end of rendering the construction simple and durable and reliable in its operation, this invention consists in certain features of construction and combinations of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure I is a side elevation, largely in section, of apparatus embodying the invention which constitutes the subject-matter of this application. Fig. II is a sectional view illustrating a suitable pressure-regulating valve with which the upper pneumatic-pressure-conducting pipe of the apparatus is provided. Fig. II is drawn on a larger scale than Fig. I.

Referring to the drawings, *a* designates a receptacle into which the oil-yieldable and gelatin-yieldable material—fish waste, fish, and other matter—is placed for treatment to extract or flow gelatin solution and oil from the material. The receptacle *a* is a closed container provided at its upper end and centrally with a charging pipe or inlet 5, provided with a normally closed slide-valve *b*, which controls continuity in the passage-way formed by the said pipe or inlet 5. The receptacle *a* is provided centrally with a core-forming vertically-arranged and suitably-supported closed heating-drum *c*. A closed heating-jacket *d* surrounds the receptacle *a* and extends from the upper extremity to the lower extremity of the receptacle. The jacket *d* comprises a casing whose chamber surrounds the receptacle *a* and is in open relation at its lower end with a valved pipe *e* for supplying the heating agent—steam or whatever it may be—to the said chamber. The valve 8 of the pipe *e* is normally closed. The chamber of the jacket *d* is connected by the pipe *f* and a pipe *g* with the upper end and lower end, respectively, of the chamber of the inner drum *c*. The heating-jacket is also provided at its lower end with a valved drain-pipe 20.

The receptacle *a* is provided at its lower end and centrally with a downwardly-extending valved pipe or outlet 10, at which is discharged the residue remaining after the removal of the oil-and-gelatin solution from the material treated within the receptacle. The valve 11 of the outlet 10 is preferably a slide-valve normally closed. Two valved pipes *h* and *k* are in open relation with the lower portion and upper portion, respectively, of the receptacle *a* and communicate with a compressed-fluid reservoir *j*, in which compressed air or other aeriform or gaseous fluid under pressure is stored. The upper pipe *k* is provided, preferably near the reservoir *j*, with a normally closed cut-off valve 12 for controlling continuity in the passage-way formed by the said pipe. The lower pipe *h* is provided with a normally closed cut-off valve 13 for controlling continuity in the passage-way formed by the said pipe *h*.

A vertically-arranged valved and vertically-adjustable oil-conducting pipe *l* extends into the upper portion of the receptacle *a*. The pipe *l* extends through a stuffing-box *m*, with which the receptacle *a* is provided, and is secured in the desired adjustment by a set-screw *n*, which extends into engagement with the pipe through a correspondingly-threaded hole formed in the casing of the said box. The pipe *l* is provided outside of and a suitable distance from the receptacle *a* with a normally closed cut-off valve *o*, which controls continuity in the passage-way formed by the said pipe. The pipe *l* connects at its outer end with a flexible tube or hose *p*. The pipe *l* is provided at its inner or receiving end with a strainer *s*. Upon opening the valve *o* when a layer of oil has accumulated on top of the mass treated within the receptacle *a* oil is readily forced or conducted from the said receptacle through the pipe *l* and the tube or hose *p*.

A valved water-supply pipe *w* is arranged to discharge into the receptacle *a* and has its valve 23 normally closed. If the moisture contained within the material undergoing treatment is not sufficient in quantity to readily enable the extraction or flowing from the material of the glue or gelatin contained in the material, additional moisture is supplied by running water into the receptacle *a* upon opening the valve 23 of the said pipe *w*.

The valve 11 of the outlet 10 is located a suitable distance below the upper end of the said outlet outside of and below the jacket *d*, and the said outlet is filled or supplied between the said valve and its upper extremity with filtering material *x*. The outlet 10 between its upper extremity and the valve 11 communicates with a valved drain-pipe *y*. The valve *y'* of the pipe *y* controls continuity in the passage-way formed by the said pipe.

By the construction hereinbefore described the gelatin solution is filtered before it reaches the pipe *y*, and a screen *r*, which is suitably applied at the receiving end of the said pipe, prevents ingress of large particles of filtering material to the said pipe. The pipe *y* is employed in draining gelatin solution from the receptacle *a*.

Obviously the filtering material within the outlet 10, upon opening the valve 11 after the treatment of a body of material within the receptacle *a*, is discharged with the residue from the said outlet.

A suitably-operated air-pump 15 is connected with the compressed-air reservoir *j*. The upper pipe *k*, which, as already indicated, is employed in establishing open relation between the compressed-air reservoir and the receptacle *a*, is provided with a pressure-regulating valve *v*, whereby is effected the maintenance of the desired air-pressure upon the mass within the said receptacle. The valve proper, 16, (see Fig. II,) of the pressure-regulating valve *v* is located within the chamber 17 of the valve-casing 18, between the inlet 25 and the outlet 26 of the said casing, and the said outlet 26 and the inlet 25 are arranged in the line of the pipe *k*. A port 27, with which the valve-casing is provided, communicates with and extends inwardly from the inlet 25 and has its inner end arranged to discharge into the valve-casing 17 toward the valve proper, which is movable toward and from the said end of the said port and opens or closes the said port, according as it is actuated from or against the port. The valve proper, 16, is formed upon an arm 28 of a flexible diaphragm 29, which is suitably applied within the valve-casing and forms one of the walls of the valve-casing chamber 17, with which the inlet 25 and the outlet 26 connect. The diaphragm 29 engages an outwardly-facing shoulder 30, which is formed upon and internally of the valve-casing, and the latter has an annular internally-screw-threaded flange 32, and a ring 33 is screwed into the said flange against the outer side of the diaphragm and holds the diaphragm against the said shoulder. An externally-screw-threaded endwise-adjustable sleeve 35 engages corresponding threads formed internally of the outer end of the ring 33. The diaphragm 29 has a stem 36 extending outwardly centrally of and through the ring 33 and through the sleeve 35, and a spring 37 is mounted and confined upon the stem 36 between the diaphragm 29 and a flange or shoulder 38, formed upon and internally of the outer end of the said sleeve. The spring 37 is under tension and acts to retain the valve proper, 16, open, so as to establish continuity in the passage-way between the inlet 25 and the outlet 26 of the valve-casing, and the tension of the spring is regulated by means of the adjustable sleeve 35 being increased or decreased, according as the said sleeve is turned in the one direction or the other. Obviously if an air-pressure of twenty pounds is to be maintained upon the mass within the receptacle *a* the tension of the spring 37 should be so regulated by a proper manipulation of the sleeve 35 that a back pressure of twenty pounds in the chamber of the valve-casing 18 and against the inner side of the diaphragm 29 shall be sufficient to overcome the action of the spring 37 and the pressure upon the comparatively small upper surface of the valve proper, so as to result in the actuation of the said diaphragm outwardly, and thereby close the valve proper, 16.

Not infrequently the mass within the receptacle *a* during the treatment of the material within the said receptacle, as hereinbefore described, will solidify or cake to such an extent as to materially interfere with or retard the extraction or flowing of the liquid product which is to be liberated from the said material, and at such time or times a disintegration of the mass is desired. An adequate disintegration of the mass without interfering with the pneumatic pressure upon top of the mass is effected by the introduc-

tion into the lower portion of the receptacle *a* of an aeriform or gaseous fluid under a pressure greater than the pneumatic pressure to which the material is subjected for the purpose of preventing a detrimental disturbance in the mass resulting from the heating of the material, and the air or aeriform fluid thus introduced under pressure into the lower portion of the receptacle *a* is preferably supplied by the same compressed-air reservoir *j* which supplies the pneumatic pressure employed to neutralize the pressure which results from the heating of the material, and in the apparatus illustrated the valved pipe *h* has its receiving end connected and in open relation with the said reservoir and is in open relation at its opposite end, as already indicated, with the lower portion of the chamber of the said receptacle. Obviously, therefore, if the desired pneumatic pressure upon top of the mass were twenty pounds per square inch, then the air or aeriform fluid stored within the reservoir *j* should be under a pressure of twenty-five pounds. As the solid portions of the mass within the receptacle *a* tend to descend by gravity and pack more closely in the lower portion of the receptacle, it is obviously important to place the pneumatic pressure which is employed to neutralize the pressure resulting from the heating of the material on top of the mass, and it is equally important to introduce the air utilized to disintegrate the mass from below, so as to cause it to pass upwardly through the mass. An outlet for the air thus passed upwardly through the mass is quite essential, and the said outlet is formed, preferably, by a pipe 50, which is in open relation with the upper portion of the chamber of the receptacle *a* and extends outside of the said receptacle. The pipe 50 is provided internally with a seat 52 for a relief-valve 53, which is normally closed and held against the said seat by a suitably-applied spiral spring 54, arranged within the said pipe at the outer side of the valve and being under the tension required to render it capable of holding the valve closed against the pneumatic pressure conducted to the receptacle by the pipe *k*, but not adequate to hold the said valve closed against a greater pressure, and consequently any pressure which the air introduced under pressure into the lower portion of the receptacle upon passing upwardly through the mass adds to the aforesaid pneumatic pressure upon top of the mass will result in the opening of the relief-valve 53 against the action of the said spring without, however, interfering with a continuous pneumatic pressure upon the mass during the treatment of the material within the said receptacle.

An annular section or ring *t* is snugly interposed between the opposing walls of the receptacle *a* and heating-jacket *d* at the upper ends of the said receptacle. The section *t* is rigidly secured to the jacket *d* and to the said receptacle *a* in any approved manner, and the pipe 5 is screw-threaded externally at its lower end and screwed into a correspondingly internally threaded upwardly-projecting flange 6, formed upon the upper end and centrally of the section *t*. The section *t* is provided also with a screw-threaded hole 7, which extends through the said section *t* and is engaged by the correspondingly externally threaded discharging end portion of the pipe *k*, which extends through the said section *t* into the chamber of the receptacle *a*. Also the casing of the stuffing-box *m* is preferably formed integral with the said section *t*. The said section *t* is provided also with a screw-threaded perforation 14, engaged by the correspondingly externally threaded receiving end of the pipe 50. It will be observed, therefore, that the pipe 5, the pipe *k*, the pipe 50, and the casing of the stuffing-box *m* are all connected to one and the same section *t*, and hence the construction is rendered simple and convenient in the assemblage of the parts. The upper portion of the casing of the jacket *d* comprises a section 15, which is riveted or otherwise rigidly secured to the adjacent portion of the said casing, and obviously the section *t* is placed in position before the said section 15 of the jacket-casing has been applied and secured in position. The casings of the jacket *d* and receptacle *a* are of course suitably slotted, as at 22, to accommodate the application and operation of the pipes 5, *l*, *k*, and 50 and the stuffing-box *m*. The receptacle *a* is encircled by several reinforcing-bands 40, which are riveted or otherwise rigidly secured to the said receptacle and materially strengthen the receptacle.

A feature of no inconsiderable importance consists also in the construction employed for establishing open relation below the lower end of the drum *c* and the chamber of the heating-jacket and for establishing open relation between the pipe *h* and the chamber of the receptacle *a*. As shown very clearly in Fig. I, the lower end of the drum *c* is screw-threaded externally, and a head-forming casting *u* has an upwardly-projecting correspondingly internally threaded flange 42 screwed onto the said end of the said drum. The head *u* has two tubular arms arranged diametrically opposite in a horizontal or approximately horizontal plane, and one of the said arms forms the pipe *g*, which is in open relation at its outer end with the chamber of the heating-jacket and communicates at its inner end with the chamber of drum *c*. The other arm 43 of the head *u* is in open relation at its outer end with the pipe *h* and communicates at its inner end with the chamber of a valve-casing 44, which is arranged vertically and screw-threaded internally at its upper end and screwed onto a correspondingly externally threaded annular flange 45, formed upon and depending from the head *u*, which is provided centrally

with a partition 46, which separates the passage-way formed by the pipe-forming arm *g* from the passage-way formed by the arm 43. The lower end of the flange 45 forms a downwardly-facing seat for a valve 47, which is normally open and rests upon a lug 48, formed upon the bottom of the valve-casing 44, which has any suitable number of apertures or orifices 49, arranged to discharge into the chamber of the receptacle *a*. Air under pressure conveyed to the receptacle *a* through the pipe *h* upon opening the cut-off valve 13 passes from the said pipe into the arm 43, and thence into the chamber of the valve-casing, and thence through the apertures or orifices 49 into the chamber of the said receptacle *a*, and obviously any back pressure within the said valve-casing when the cut-off valve 13 is closed and the pipe *h* is not in operation results in the closing of the valve 47, so as to prevent solid matter from obtaining ingress to the arm 43 from the chamber of the receptacle *a*. Each arm of the head *u* is provided at its outer end with an annular flange 41, which is riveted or otherwise rigidly attached to the casing of the receptacle *a*, and the head *u* and its arms 43 and *g* are therefore instrumental not only in supporting the drum *c*, but in reinforcing the said receptacle at its lower portion, where great strength is more especially required.

In operating the apparatus the material requiring treatment is introduced at the inlet 5 upon opening the valve *b*. The receptacle *a* is filled with material from the inlet 5 to the upper end of the drum *c*. When the receptacle has been supplied with material, the valve *b* is closed and the valve 8 of the pipe *e* is opened to supply steam or heating fluid to the chamber of the jacket *d* and by means of the pipes *f* and *g* to the chamber of the drum *c*. Steam is preferably employed, and a pressure of steam sufficient to heat the material within the receptacle *a* quickly and thoroughly—say a pressure of about fifteen pounds—is employed; but so high a pressure of steam would, unless the mass were kept quiet by some other agency, result in boiling the mass to such an extent as to quickly result in an emulsification of the oil extracted from the material, and also a temperature as high or higher than 212° Fahrenheit would, unless the mass were kept quiet by some other agency, result in heating the mass to such an extent as to result in the destruction of or injury to the capacity of the gelatin-yieldable liquid to congeal after the drainage of the said liquid from the receptacle, and consequently air or other aeriform or gaseous fluid under sufficient pressure is admitted to the receptacle *a* on top of the mass within the said receptacle *a* by the pipe *k* upon opening the valve 12 of the said pipe. A pneumatic pressure greater than the pressure which results from the heating of the material has been found necessary to prevent boiling of the mass during the treatment of the material, and a pressure of twenty pounds per square inch on top of the mass has been found efficient against fifteen pounds of steam-pressure employed in heating the mass. The pneumatic pressure on top of the mass is of course applied before any agitation of the material from fermentation or heat is possible, and the mass is kept under the said pressure during the treatment of the material. Oil contained in the material undergoing treatment and becoming liberated during the treatment of the material rises to the top of the mass and there accumulates, and the pipe *l* is lowered until its strainer *s* is submerged in the risen layer of oil when oil is conducted through the said pipe from the receptacle. As already indicated, the mass within the receptacle *a* must not be permitted to boil, and the pneumatic pressure on top of the mass must, therefore, not only be continuous, but adequate at all times to prevent boiling of the mass by the heat to which it is subjected. A pressure within the reservoir *j* in excess of the pressure required upon the mass to prevent boiling is therefore maintained, and the said pressure upon the mass is kept uniform through the medium of the pressure-regulating valve *v*, whose spring 37 has its tension adjusted to yield to a back pressure of twenty pounds upon the diaphragm 29. When the mass begins to cake or solidify to such an extent as to obstruct the flow or liberation of the liquid from the solid particles of the mass, the valve 13 is opened, so as to permit air under a pressure greater than the pressure maintained on top of the mass to pass into the lower portion of the mass and thence upwardly through the mass. The air thus passed upwardly through the mass disintegrates the mass and participates in and facilitates the liberation of oil and gelatin-yieldable liquid and facilitates the rise of the oil to the top of the mass and the gravitation of the gelatin-yieldable liquid to the lower end of the mass. The air thus passed upwardly through the mass upon reaching the top of the mass and being under a pressure of twenty-five pounds adds to the pressure already maintained on top of the mass and results in the opening of the relief-valve 53 against the action of the spring 54; but the said spring, as already indicated, is strong enough to hold the valve 53 closed against the action of the pneumatic pressure maintained on top of the mass, and hence in practice the result is a continuous pneumatic pressure on top of the mass greater than the pressure resulting from the heating of the material, and whenever the valve 13 is opened the disintegration of the mass by the passage of air upwardly through the mass and the passage from the upper end of the receptacle *a* at the outlet formed by the pipe 50 of any air in excess of the pneumatic pressure required upon the mass.

The process carried out by the apparatus described and shown in this application con-

stitutes the subject-matter of an application, Serial No. 99,130, filed by me March 20, 1902.

What I claim is—

1. In rendering apparatus, the combination, with a closed receptacle having a material-receiving inlet; means for heating the receptacle, and means for conducting the extracted liquid from the receptacle, of means for introducing, into the receptacle, a pneumatic pressure greater than the pressure which results from the heating of the material, and means for passing air or an aeriform body through the mass treated within the receptacle while the mass is acted upon by the aforesaid pneumatic pressure, substantially as and for the purpose set forth.

2. In rendering apparatus, the combination, with a closed receptacle having a material-receiving inlet; means for heating the receptacle, and means for conducting the extracted liquid from the receptacle, of means for maintaining, on top of the mass introduced into the receptacle, a pneumatic pressure greater than the pressure which results from the heating of the material, and means for passing air or an aeriform body upwardly through the mass treated within the receptacle while the mass is maintained under the aforesaid pneumatic pressure, substantially as and for the purpose set forth.

3. In rendering apparatus, the combination, with a closed receptacle having a material-receiving inlet; means for heating the receptacle, and means for conducting the extracted liquid from the receptacle, of means for maintaining, in the receptacle, a pneumatic pressure greater than the pressure which results from the heating of the material; means for introducing, into the lower portion of the receptacle, air or an aeriform body which is under a pressure greater than the aforesaid pneumatic pressure; an air-outlet extending from the upper portion of the chamber of the receptacle, a relief-valve normally closing the said outlet, and means acting to retain the said valve in its closed position and being powerful enough to prevent the said valve from being opened by the pneumatic pressure maintained within the receptacle as aforesaid, but adapted to yield upon an addition to the said last-mentioned pressure by the air or aeriform body introduced into the lower portion of the receptacle.

4. In rendering apparatus, the combination, with a closed receptacle having a material-receiving inlet; means for heating the receptacle, and means for conducting the extracted liquid from the receptacle, of a compressed-air reservoir externally of the aforesaid receptacle; a pipe in open relation with the said reservoir and discharging into the aforesaid receptacle; a pressure-regulating valve in the line of the said pipe, and means for affecting the passage of air or an aeriform body upwardly through the mass treated within the first-mentioned receptacle while the said mass is maintained under a pneumatic pressure conducted to the said receptacle by the aforesaid pipe, substantially as and for the purpose set forth.

5. In rendering apparatus, the combination, with a closed receptacle having a material-receiving inlet; means for heating the receptacle, and means for conducting the extracted liquid from the receptacle, of a compressed-air reservoir outside of the aforesaid receptacle; a pipe in open relation with the said reservoir and discharging into the upper portion of the aforesaid receptacle; a pressure-regulating valve in the line of the said pipe; a pipe in open relation with the compressed-air reservoir and discharging into the lower portion of the first-mentioned receptacle; a cut-off valve in the line of the last-mentioned pipe; an air-outlet connected with the upper portion of the chamber of the first-mentioned receptacle; a valve normally closing the said outlet, and means acting to retain the said last-mentioned valve in its closed position and just powerful enough to maintain the said valve closed against the pneumatic pressure maintained on the mass to prevent boiling of the mass.

6. Rendering apparatus comprising a receptacle into which the material requiring treatment is placed; a heating-jacket surrounding the said receptacle; an annular section *t* interposed between and rigidly secured to the casings of the jacket and aforesaid receptacle at the upper end of the receptacle; a charging-pipe attached to the said annular section and in open relation, at its lower end, with the chamber of the aforesaid receptacle, a liquid-conducting pipe extending into the upper portion of the said receptacle, and a stuffing-box surrounding the said pipe and having its casing rigid with the aforesaid annular section.

7. Rendering apparatus comprising a receptacle into which the material requiring treatment is placed; a heating-jacket surrounding the said receptacle; an annular section *t* interposed between and rigidly secured to the casings of the jacket and aforesaid receptacle at the upper end of the receptacle; a valved charging-pipe attached to the said annular section and in open relation, at its lower end, with the chamber of the aforesaid receptacle, and a pipe for conducting air under pressure into the upper portion of the chamber of the said receptacle and attached to the aforesaid annular section.

8. Rendering apparatus comprising a receptacle into which material requiring treatment is placed; a heating-jacket surrounding the said receptacle; means for conducting the heating agent into the chamber of the jacket; an upright heating-drum arranged centrally of the aforesaid receptacle; a head attached to the lower end of the drum and having a tubular arm communicating, at its inner end, with the chamber of the drum and in open relation, at its outer end, with the chamber of the jacket, which head is provided with

another tubular arm adapted to conduct air or any aeriform body into the lower portion of the receptacle below the drum, and a pipe for conducting the air or other aeriform body into the last-mentioned arm.

9. Rendering apparatus comprising a receptacle into which material requiring treatment is placed; a heating-jacket surrounding the said receptacle; means for conducting the heating agent into the chamber of the jacket; an upright heating-drum arranged centrally of the aforesaid receptacle; a valved pipe for conducting air to the receptacle; a head attached to the lower end of the drum and having two tubular arms and a partition separating the passage-ways formed by the said arms, and one of the said arms establishing open relation between the chamber of the jacket and the chamber of the drum, and the other arm being in open relation with the aforesaid air-conducting pipe and arranged to conduct air into the lower portion of the aforesaid receptacle.

10. Rendering apparatus comprising a receptacle into which material requiring treatment is placed; a heating-jacket surrounding the said receptacle; means for conducting the heating agent into the chamber of the jacket; a valved pipe arranged to conduct air to the lower portion of the aforesaid receptacle; an upright heating-drum arranged centrally of the said receptacle and provided, at its lower end, with a head having two oppositely-arranged tubular arms and a partition separating the passage-ways formed by the said arms, which arms are attached to and reinforce the lower portion of the aforesaid receptacle, and one of the said arms establishing open relation between the chamber of the drum and the chamber of the jacket, and the other arm being in open relation with the aforesaid air-conducting pipe and arranged to conduct air into the aforesaid receptacle below the drum.

In testimony whereof I sign the foregoing specification, in the presence of two witnesses, this 15th day of March, 1902, at Cleveland, Ohio.

EUGENE R. EDSON.

Witnesses:
C. H. DORER,
G. M. HAYES.