No. 707,566. Patented Aug. 26, 1902.

E. R. EDSON.

PROCESS OF REDUCING OR RENDERING FISH OR OTHER MATERIAL.

(Application filed Mar. 20, 1902.)

(No Model.)

FIG. I.

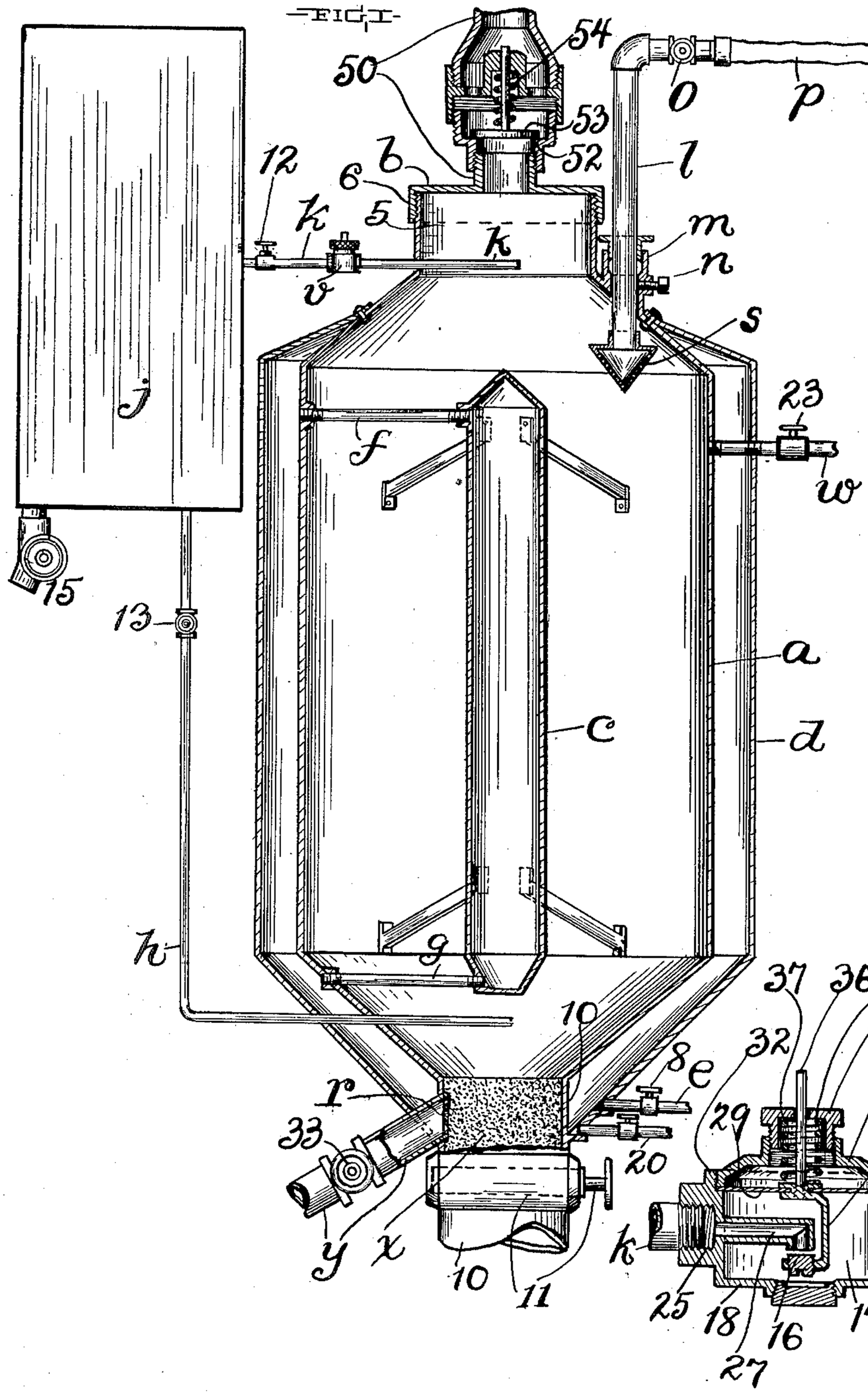

FIG. II.

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PROCESS OF REDUCING OR RENDERING FISH OR OTHER MATERIAL.

SPECIFICATION forming part of Letters Patent No. 707,566, dated August 26, 1902.

Application filed March 20, 1902. Serial No. 99,130. (No specimens.)

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 Processes of Reducing or Rendering Fish or other Material; 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 an improved process of 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 extract gelatin-yieldable liquid and oil from material of the character indicated rapidly and thoroughly by heating the material within a closed receptacle and 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 when the mass within the receptacle has caked or become so closely packed as to obstruct or retard the flow of oil or extracted product from the solid particles of the mass passing through the mass air or any 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 the invention consists in the process hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure I is a side elevation, largely in section, of apparatus suitable for use in carrying out the process 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, or 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 with a charging aperture or inlet 5, normally closed by a suitably-applied cover *b*, which is shown provided with a depending annular internally-screw-threaded flange 6, which engages corresponding threads formed upon and externally of the body portion of the receptacle *a*. The receptacle *a* is provided centrally with a vertically-arranged and suitably-supported closed heating-drum *c*. A closed heating-jacket *d* surrounds the receptacle *a*. 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 chamber of the jacket *d* is connected by pipes *f* and *g* with the upper and lower ends of the chamber of the inner drum *c*. The valve 8 of the pipe *e* is normally closed. 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*, arranged to discharge into the lower portion and upper portion, respectively, of the receptacle *a*, lead from a compressed-fluid reservoir *j*, in which the 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.

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 at its upper end 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 upper end with a flexible tube or hose *p*. The pipe *l* is provided at its 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 siphoned from the said receptacle through the pipe *l* into 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 pipe *w*.

The valve 11 of the outlet 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 33 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 adapted to establish 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 chamber 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 23 and through the sleeve 35, and a spiral 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 move the valve proper, 16, connected therewith, into its closing position.

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 the mass is effected by the introduction into the lower portion of the receptacle *a*, preferably underneath and near the core or inner drum *c*, of an aeriform or gaseous fluid under a pressure greater than the pneumatic pressure to which the material is subjected for the pur-

pose 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 arranged to discharge at its opposite end into the receptacle *a* underneath and in close proximity to the central or inner core or heating-drum *c* of the said receptacle. Obviously, therefore, if the desired pneumatic pressure upon the mass were twenty pounds per square inch then 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 extends upwardly from and is attached to the cover *b*. The pipe 50 is in open relation, at its lower end, with the chamber of the receptacle *a* and 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 above the valve and under the tension required to render it capable of holding the valve closed against the pneumatic pressure conducted into 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, tends to add to the aforesaid pneumatic pressure upon the 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.

In operating the apparatus the cover *b* of the receptacle *a* is opened and material requiring treatment is introduced at the inlet 5. 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 cover *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 as or higher than 212° Fahrenheit would, unless the mass were kept quiet by some other agency, result in heating or agitating 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 upper 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 apparatus described and shown in this application is claimed in application, Serial No. 100,751, filed by me March 31, 1902.

What I claim is—

1. An improvement in obtaining a liquid product from material of the character indicated, comprising the heating of the material within a closed receptacle and placing and maintaining the material, during its treatment within the receptacle, under a pneumatic pressure greater than the pressure which results from the heating of the material, and, whenever the mass within the receptacle begins to cake or pack to such an extent as to materially retard the flow or liberation of the liquid product from the material, introducing, into the mass, air or aeriform fluid under a pressure greater than the first-mentioned pressure without interruption of the said first-mentioned pressure.

2. An improvement in obtaining a liquid product from material of the character indicated, comprising the heating of the material within a closed receptacle and subjecting the material, during its treatment within the receptacle, to a pneumatic pressure placed on top of the mass within the receptacle and greater than the pressure which results from the heating of the material, and, whenever the mass begins to cake or pack to such an extent as to materially retard the flow or liberation of the liquid product from the material, introducing, into the lower end of the receptacle, air or aeriform fluid under a pressure greater than the first-mentioned pneumatic pressure without interruption of the said first-mentioned pressure.

3. An improvement in obtaining a liquid product from material of the character indicated, comprising the heating of the material within a closed receptacle and placing and maintaining the material, during its treatment within the receptacle, under a pressure greater than the pressure which results from the heating of the material, and, whenever the mass within the receptacle begins to cake or pack to such an extent as to materially retard the flow or liberation of the liquid product from the material, introducing, into the mass, air or aeriform fluid under a pressure greater than the first-mentioned pressure, and relieving the receptacle of any pressure in excess of the said first-mentioned pressure.

4. An improvement in obtaining a liquid product from material of the character indicated, comprising the heating of the material within a closed receptacle and subjecting the material, during its treatment within the receptacle, to a pressure placed on top of the mass within the receptacle and greater than the pressure which results from the heating of the material, and, whenever the mass begins to cake or pack to such an extent as to materially retard the flow or liberation of the liquid product from the material, introducing, into the lower portion of the receptacle, air or aeriform fluid under a pressure greater than the first-mentioned pressure, and relieving the receptacle, at the upper end thereof, of any pressure in excess of the aforesaid first-mentioned pressure.

In testimony whereof I sign the foregoing specification, in the presence of two witnesses, this 1st day of March, 1902, at Cleveland, Ohio.

EUGENE R. EDSON.

Witnesses:

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