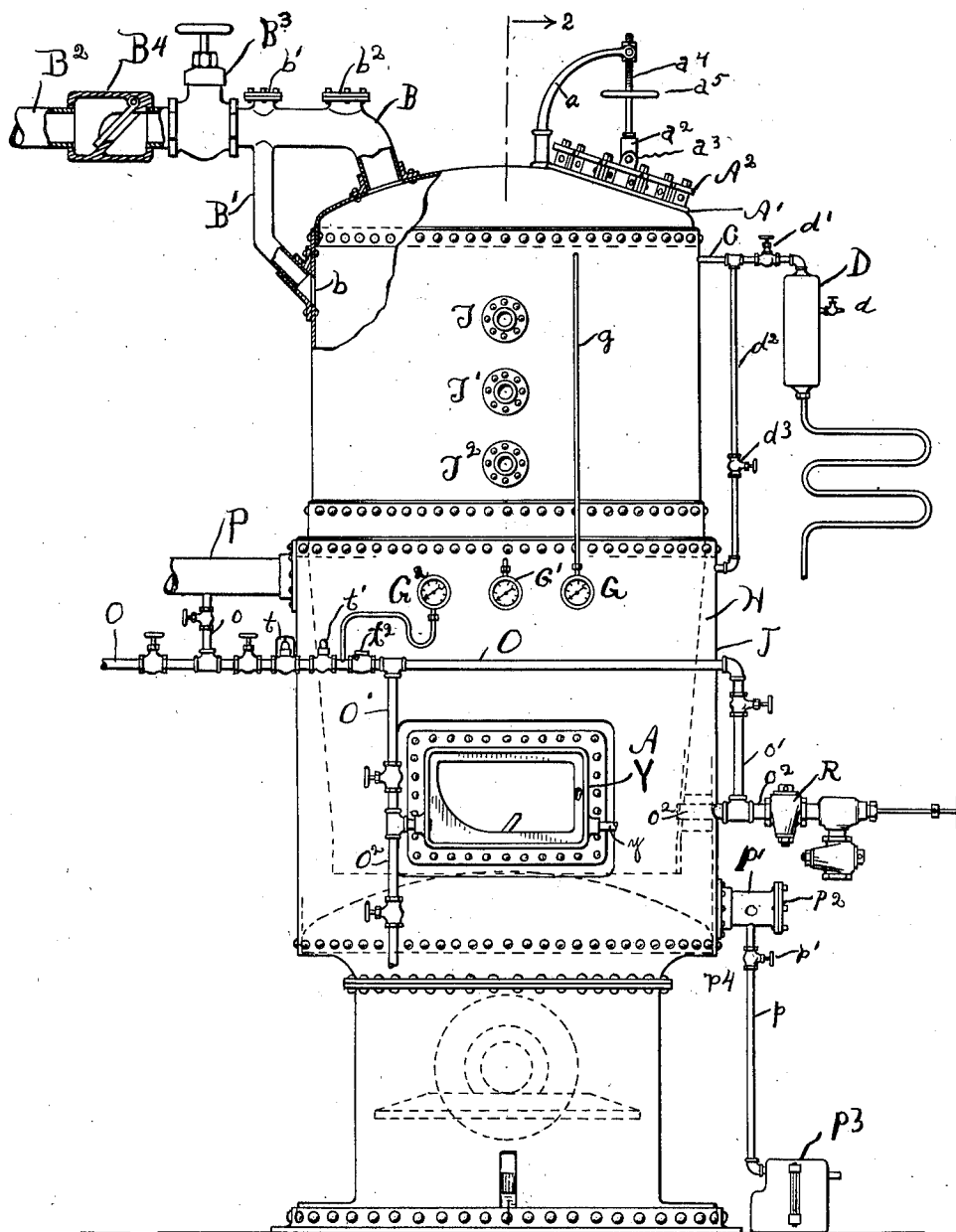


980,665.

3 SHEETS--SHEET 1.

Fig I.



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RENDERING APPARATUS.
APPLICATION FILED FEB. 19, 1906.

980,665.

Patented Jan. 3, 1911.

3 SHEETS-SHEET 3.

Fig III.

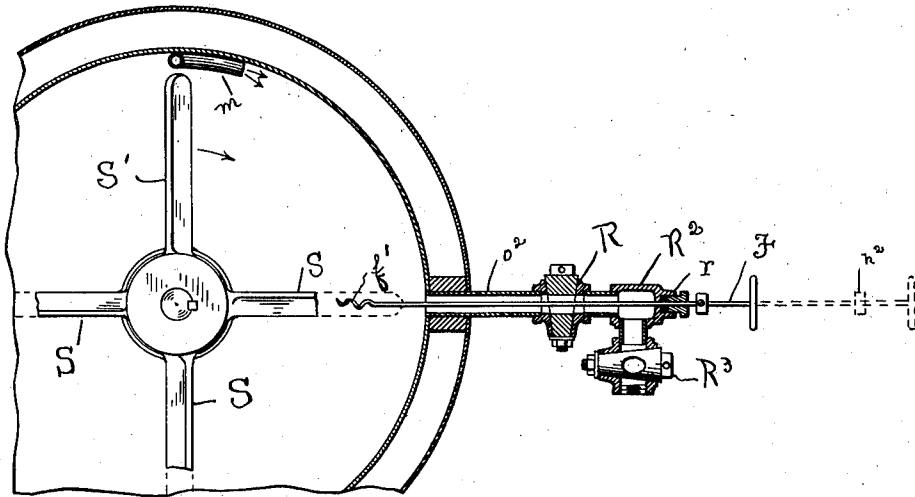
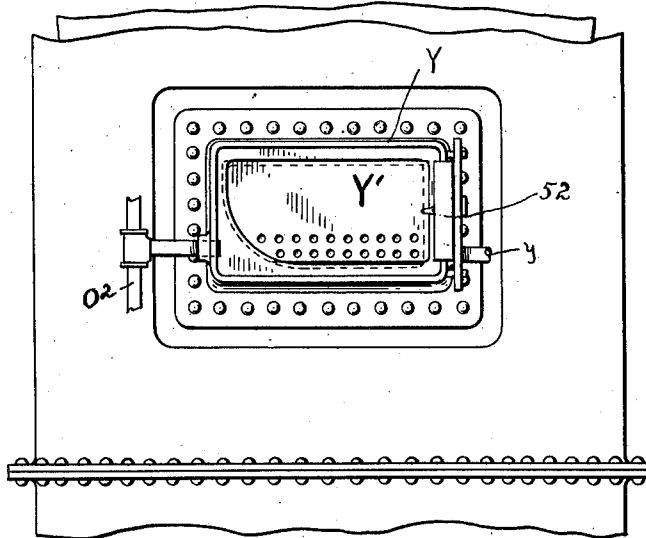


Fig IV.



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UNITED STATES PATENT OFFICE.

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RENDERING APPARATUS.

980,665.

Specification of Letters Patent.

Patented Jan. 3, 1911.

Application filed February 19, 1906. Serial No. 301,949.

To all whom it may concern:

Be it known that I, CHARLES E. ORD, a citizen of the United States, residing in Brooklyn township, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Rendering Apparatus; and I do 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

My invention relates to the destructive treatment of garbage embodying the rendering or extracting of the fats from the animal matter, and the drying of the residuum, and the treatment of the same, the entire process being performed in the same tank or vessel, and the obnoxious vapors being eliminated through the condenser, and the less volatile vapors being employed in the heating chamber.

The objects of this invention are, to obtain any evenly distributed heat area throughout the mass contained within the tank, and the utilization of the exhaust or low pressure steam for the drying process.

Another object of my invention is to allow the live steam to be employed, first for the purpose of agitating the mass during the cooking process of the residuum; and secondly to allow the live steam to be introduced into the different conduits and at the discharge door for cleansing purposes.

Another object is to provide means for eliminating obnoxious odors, emanating from the still or converter, during the primary operation upon the mass contained therein and providing means in this connection for condensing the vapors and conducting them to proper sewerage conveyers.

My invention consists in the combination hereinafter fully set forth for the purpose of obtaining the above results and objects, and this invention further consists in the parts and combination of parts, conveniences and safety appliances, which will be also hereinafter fully set forth and claimed.

In the drawings Figure I, is a view in front elevation of a device constructed according to my invention. This figure illustrates the device externally for the most part, showing the arrangement and location of the parts such as pipes, condensers, steam inlets and outlets. At the left hand upper portion of this figure a portion is cut away, illustrating the interior of the parts

of the receptacle, and the vacuum pipe valve and check valve. Fig. II, is a vertical sectional view taken through line 2—2 Fig. I looking in the direction of the arrows, illustrating the interior arrangement and also parts not clearly shown in Fig. I. Fig. III, illustrates a cross sectional view taken through the container and the testing device, the latter turned in a horizontal plane. Fig. IV is an enlarged form of the residuum discharge door-way by means of which the residuum may be removed. In this figure the door 52 is shown, which consists of a proper flanged plate hermetically attached, and will be readily understood, and its construction may be varied.

The improved construction of the door is of the same style as that in my Patent No. 568,696, dated Sept. 29, 1896, with the exception that in this invention I have provided means for introducing live steam within the door casing and the perforated plate, closing the door orifice which allows the live steam to enter the tank A, but prevents the residuum from dropping out.

In the drawings A represents an upright distilling, rendering and drying tank, adapted to receive the offal or mass to be treated, which is fed to the tank through the charging orifice A' at the upper part of the tank. This charging orifice A' is illustrated in Figs. I and II and is provided with a cover A² adapted to be removed from said orifice and to be hermetically sealed or closed.

In order to properly handle the cover A², I have provided at the upper end of the tank A, a davit a, the lower end of which is secured to the top of the tank A, and the upper end being pivotally secured to the nut a' which engages with the depending screw rod a⁴, the lower end of the rod a⁴ is swiveled and attached to the upper portion of the cover A² at its central portion. This swivel attachment a² is preferably pivoted as at a³, to the cover A². It will thus be seen that by manipulating the rod a⁴, which is preferably done by a hand wheel a⁵ the cover may be raised or lowered and hermetically sealed in position and that when raised the cover A² may be swung out of the way thus facilitating the charging of the tank A. Also secured to and communicating with the upper portion of the tank A is an exhaust or vacuum pipe B which has a branch B' depending from it

and also communicating with the upper end of the tank A at a point beneath the top as at *b*.

The pipe B', it will be noticed, is located so as to communicate with the lower portion of the steam pipe B and from thence extending downward so as to communicate with the tank A. It will also be noticed that the pipe B is provided with capped orifices *b'*, *b*², which are emergency connections, utilized both for the purpose of cleansing the vacuum pipe, at this point, and for the attachment of vacuum connections in case of emergency such as the inoperativeness of the vacuum pump or leakage of the pipe B². The vacuum pipe B is provided with a cut-off valve B³ which is preferably of the gate valve construction, but may be of any suitable construction adapted for the purpose.

Inasmuch as it often happens that through the leakage of the pipe B² and its connections with the vacuum pump not shown, or through the stoppage of the vacuum pump, the vacuum in the tank A is not maintained to a desirable extent or degree and hence I have provided an emergency check valve B⁴ which will close when any leakage occurs, and thus maintain the vacuum in the tank A and prevent the syphoning of the water from the vacuum pump into the tank until such time as repairs can be made or attachment be made either to the pipe B or by means of the capped orifices *b'*, *b*². It will thus be seen that the apparatus may be in operation until repairs can be made or the drying operation completed.

At the upper end of the tank A I have provided a gas escaping pipe C, through which the obnoxious gases pass which emanate during the rendering or drying process. These gases pass into a disinfecting or condensing apparatus and from thence to a proper sewage in a harmless condition. Connected also at the upper end of the tank A, is a vacuum gage G, which is connected and communicates with the interior of the tank A, through the pipe *g*. This gage indicates the degree of vacuum. It will of course be understood that the chamber A, when the apparatus is in operation, is hermetically sealed.

The orifices T, T', T², may be provided in the side of the rendering and drying tank A, communicating with the interior thereof, and located at the upper portion of the tank A, and at different levels. These orifices are provided with strainers 50 of any suitable construction to prevent any solid material from passing out through the pipes, and attached to the pipes leading from these orifices may be supplied suitable stop cocks 51. The function of these orifices, as located, is twofold, first to draw off any water

that may emanate during the rendering process, and second to carry off any of the fats or oils. It will thus be seen from the above description that, the rendering tank A, is provided with all necessary adjuncts and auxiliaries to meet the requirements in the most convenient, labor saving, and perfect manner.

Relative to the drying and heating mechanism, it will be noticed that the tank A, diminishes in an inverted conical shape from its central portion downward, and that it is surrounded at its sides by a cylindrical casing J which leaves an annular heating chamber H surrounding the lower portion *f*, of the tank A, which the chamber H incloses. The object of gradually reducing the area of the tank A as above set forth is first to provide, at the lower portion of the tank lesser area, and a lesser cross section of mass to be operated upon by the agitator blades S and thus allowing the tank to be built of any suitable dimensions and still not increase the strain upon the agitator blades, and secondly it obviates the necessity of providing greater power to operate the agitator blades.

A double function is attained by thus constructing the lower portion of the tank A, and the chamber H, in the first place, by the inverted conical shape of the lower part of the chamber A, the mass within the container is collected at the lower end of said chamber where it is agitated by means of scraper-blades S, which may be four or more in number, and revolve in the direction of the arrow, shown in Fig. II on the shaft S', which carry blades, and also facilitate the removal of the dried residuum through the doorway E. The construction of this door being such as is set forth in my patent hereinbefore mentioned. In the second place by narrowing the heating chamber H at its upper end and enlarging its area at its lower end, I find that a more uniform heating of the mass is attained, because at the upper portion of the heating chamber both the exhaust and live steam are fed by means of a pipe P which communicates with the upper end of said chamber H, as does also the pipe *d*².

It will be noticed by referring to Fig. II of the drawings that the bottom plate of the drying and rendering tank A is formed rounding at its periphery, forming an annular pocket at this point, the object of which is to provide an annular receptacle for foreign matter, such as iron or steel which might come in contact with the blades or work under them. The action of the blades is such that upon slightly raising the blades, the foreign matter will be forced into this annular receptacle by centrifugal force, and hence these foreign matters are placed out of the way of the blades, and

will prevent the wearing of the blades or the wear of the bottom of the tank. At the lower end the tank A is supported by stay bolts *s* from the convex plate U, which forms the top of the supporting casing for containing the driving and adjusting mechanism for the blades S, and by thus supporting the bottom of the tank A the steam is allowed to heat the under or bottom portion of said tank and the convex shape of the plate U, offers a support for the tank A. The convex shape of the plate U in the first place strengthens the support of the tank; another function of the plate U, as above set forth is that by thus shaping the bottom of the chamber H, the water flows to the periphery of said plate and the chamber H, as is easily seen, and then through the pipe P'; and from thence either directly, when the cap P² is removed, or through the pipe *p* into the trap P³, when the valve *p'* is open.

The bearing and stuffing box S² for the shaft S' is supported by said plate U. The lower end of the shaft S' is received within the step S³, which is of any suitable formation, either the style illustrated in Fig. II, or it may be of the ball bearing type. The shaft S' is driven by suitable gear and pinion, such as V, V', respectively. The gearing V' is splined to the shaft S' so that said shaft S' may be raised or lowered, allowing the blades S, S, to rise or lower. The blades S, S, are adjusted in relation to the bottom of the tank A by means of a lever L with adjusting means such as L'. A link 8 connects the lever L, near the fulcrumed end thereof to a side bracket 9, and is designed to support one end of said lever in the event of the breakage of the fulcrum pin 10. The shaft S' is held in the step S³ which is secured to the lever L and the gearing V' rests upon supporting blocks 11 placed on opposite sides of said step, one of said blocks being shown in Fig. II. The shaft S' being capable of vertical adjustment allows the blades S, S, to be raised or lowered. The adjusting device L' determining the distance at which the blades shall be elevated above the bottom of the tank A.

The supporting casing N is preferably formed separable from the casing J for convenience in setting up the device, but this is not necessary and only a matter of convenience where the space prevents the setting up of the apparatus when it is formed integral.

As illustrated in Fig. II of the drawings and in Fig. III I have shown a live steam pipe M which communicates with the interior of the chamber A at its lower portion as at *m*, and is directed at its lower end so as to force the steam in the same direction as the blades S revolve. The object of thus entering the steam into the tank A is twofold, first the introduction of live steam at the

lower portion of the tank A passing through the residuum will aid in agitating it, separating the particles, while at the same time, carry off all of the by-products and coagulate all albuminous matters as will be found in the residuum after the rendering process has ceased. The steam in the chamber A moves in the same direction as the blades S, and serves to aid the blades and acts as an auxiliary to them in moving the mass, and preventing the settling of the same around the inner walls *f*. The pipe M it will be understood leads from a suitable boiler, as do all live steam pipes illustrated in the apparatus. During the rendering process live steam is employed preferably, while during the drying process exhaust steam may be used, unless desired to quicken the process.

The exhaust steam from any convenient source of supply, not shown, is fed to the chamber H at its upper end through the pipe P, and as it condenses it flows through the discharge outlet P' as does also the live steam used for the rendering process. Any obnoxious vapors within the tank A will pass as hereinafter described, through the conduit P' into a proper disinfecting and condensing apparatus. The pipe *p* leading to the trap P³ is provided with a valve *p'*, whereby the communication with the trap P³ is cut off, if found desirable, and under certain conditions. This pipe P' is located at the lower portion of the chamber H at one side thereof so as to thoroughly drain said chamber.

Live steam or steam under pressure, can be supplied to the chamber H through the medium of the valve and pipe O and also the valve O'. This is convenient both for the purpose of facilitating the rendering process when the exhaust steam is insufficient for the purpose and for the drying process of the residuum in the tank. The pressure in the chamber H is indicated and can be ascertained through the gage G'.

Live steam is introduced into the lower portion of the tank A through the pipe O, which is provided with a pressure regulator *t*, and a safety valve *t'*, and also with a pressure indicator G², and a check valve *t*², thus keeping the pressure of the steam introduced in the tank A at this point completely under control and providing means for ascertaining the pressure within the pipe O. The pressure of the steam of the pressure within the tank A is ascertained by means of a gage G, and the three gages G, G', G², are preferably placed on a line so that a glance will ascertain the condition of the several parts.

The live steam inlet pipe O is branched as at O' and at its lower end is coupled so as to connect with the pipe O² which leads into the tank A, through the doorway chamber Y.

For the purpose of testing the materials or residuum, I provide a pipe o^2 extending outward and provided with a large valve R. This construction is more clearly shown in Fig. III of the drawings, in section, where the valve is shown open. A pipe extends from the valve R to a chamber R^2 which is provided on its end with a stuffing box r through which runs the rod F which is the testing rod. This rod is provided on its inmost end with a spiral so constructed that when it is inserted into the mass a portion of said mass of the residuum will adhere to it and will be carried with it as it is withdrawn, the spiral end f' is received within the chamber R^2 , after which the stop cock R may be closed, and upon the opening of the stop cock or valve R^3 and shaking the rod F, the material adhering at f' will drop from the chamber and may be examined as to its condition. The object of so constructing this testing device is to enable the operator to test the residuum without interfering with the vacuum in the container A. A small stop block h^2 is placed on the rod F in a manner so that it may be adjusted to determine the inward distance into the mass, which is desired to be tested.

Still another feature of my invention is the providing of a casing (see Fig. IV) such as Y around the doorway which forms a chamber exterior of said doorway allowing the door 52, which may be removed or hermetically sealed in position, to close the chamber Y. And acting as a diaphragm in the opening of the doorway is a plate Y' which is perforated at its lower portion. This plate Y' forming the inner side of said chamber Y and preventing the residuum or matter within the tank A from escaping. The pipes y, y , lead into the chamber at the sides thereof and when the doorway is hermetically sealed, the live steam is fed through said pipes y, y , and entering the chamber A, thus clearing the doorway of any material that may be clogged at the same, and leaving the clear steam to be fed at the lower part of the tank A. These pipes y, y , are fed from the pipe O' leading from the pipe O.

The operating of my device is as follows: The tank is first charged with a proper quantity of water, the exhaust steam from any suitable supply is then turned into the chamber H, through the pipe P at the upper end of said chamber until the water in the tank A is about at the boiling point, at this point the tank A is ready to be charged, which is done by opening the cover A^2 in the manner hereinbefore described. After the tank A is charged to a predetermined extent, depending upon the matter to be treated, the cover A^2 is replaced on its opening and hermetically sealed in position. Live steam is then introduced into the tank

A through the pipe O' which leads to the door casing Y which is also hermetically sealed by its door, and from thence the live steam passes through the perforations in the plate y' into the mass. This results in setting up a circulation in the mass and also in agitating the particles. This feeding of the live steam is kept up for a required time (about 3 or 4 hours) according to the matter to be treated and its condition, this results in relieving the fats from the matter, and allow them to rise to the upper portion of the tank and above the water. However as the live steam must be introduced into the mass under a predetermined pressure according to the material to be treated, the pressure and the quantity of the same is controlled by a pressure regulator valve t , should the pressure regulator valve at any time refuse to work the safety valve t' will determine the requisite amount of pressure. At a point farther along the pipe O and beyond the connection of said pipe with the gage, is located a check-valve t^2 so arranged as to prevent any back flow from the tank A through said pipe.

After the live steam has been fed into the tank A the valve d' is opened which releases the obnoxious vapors into the condenser D. When these obnoxious vapors have passed, which may be ascertained by the flow from the discharge pipe, the valve d^2 , is opened. This allows the steam at the upper portion of the tank A to pass into the chamber H, retaining an equilibrium and preventing, to a great extent, any waste of heat, and furthermore releasing any overpressure within said tank, and thus utilizing at the same time the heat generated in the tank A, and preventing condensation of steam in said tank to a great extent. It happens in some cases there might be more or less of the obnoxious vapors commingling with the steam passing through the pipe d^2 and hence into the chamber H, thus making necessary an escape through the pipe P' of the same, and through the condenser p^3 or if found necessary through a separate condenser.

After the oils have been obtained, if there should be any surplus water between the residuum and the oil it can be released through the orifices T, T', T², according to its height in the tank, as can also the oil obtained through the cooking process; the live steam being cut off. After the live steam has been cut off and the oil has been removed, the residuum is in condition to be treated, exhaust steam is turned into the chamber H, through the pipe P for the purpose of drying and draining the moisture from said residuum, live steam may also be introduced at this point if found desirable in order to hasten the drying.

During the drying process vapors are

emitted from the residuum, but are sucked out through the vacuum pipe B by means of the suction apparatus, which consists of the usual water injector type, and pump. The water cooling the vapor forming a vacuum, in connection with the operating of the pump.

Should any foreign matter enter into the pipe B it will be led through the pipe B' so as to return again to the tank.

From time to time tests can be made in the manner hereinbefore set forth, by means of the testing rod F which is so arranged in connection with the pipe and chamber heretofore set forth that the vacuum is not interfered with, or the operating stopped. When the contents of the drying chamber are found to be thoroughly dried, the vacuum is broken by stopping the vacuum pump and opening the cover A². The discharge door 52 at the lower end of the tank A, is then opened, giving access to the doorway Y and the perforated plate y' is removed, and the blades being set in motion will automatically discharge the fertilizer. The value of the fertilizer depends upon the amount of ammonia contained.

In the drawings and in the specification as above set forth I have illustrated arrangements of pipes, tanks, driving mechanisms, and agitators, in the manner which I consider them best adapted for the purpose, but I do not hence wish to be limited to these details of construction as they may be departed from and still be embodied in my invention.

What I claim is:

1. A device of the class described, comprising a closed rendering and drying tank formed with a double bottom, the lower portion thereof being inverted conically-shaped, agitators located in said tank adjacent the bottom thereof, a cylindrical jacket surrounding the lower portion of said tank, and forming a heating chamber of less area at its upper portion and of greater area at its lower portion, said tank provided with a series of discharge orifices located one above the other and communicating with the interior thereof, a vapor pipe communicating with the upper portion of the closed tank, a condenser or disinfector, said vapor pipe communicating with the condenser or disinfector and with the upper portion of the heating chamber, and means for controlling

the flow of said pipe to either one or the other thereof

2. A drying and rendering apparatus comprising in combination a drying and rendering tank, a mechanical agitator positioned adjacent the bottom and within said tank, said agitator mounted upon a shaft capable of vertical longitudinal movement, a pinion splined to said shaft and meshing with a power gear, a pivoted lever, and a step centrally positioned thereon, the lower end of said shaft seated in said step, an adjustable screw device attached to the end of said lever opposite the pivot point thereof and adapted to raise and lower the agitator, as described.

3. A drying and rendering apparatus comprising in combination a drying and rendering tank, a door-way located adjacent the bottom thereof, a closure for said door-way, said door-way being provided with a chamber, a diaphragm provided within the opening of the door-way, said diaphragm having perforations through the lower portion thereof for conducting live steam through said door-way to the interior of the drying and rendering tank, and oppositely-disposed pipes for live steam entering said chamber at opposite points and alining with the perforations in said diaphragm.

4. A device of the class described comprising a closed rendering and drying tank formed with a double bottom, the lower portion thereof being inverted conically-shaped, agitators positioned in said tank adjacent the bottom thereof, a cylindrical jacket surrounding the lower portion of said tank and forming a heating chamber of less area at its upper portion and greater area at its bottom portion, said tank provided with a series of discharge orifices alining one above the other and communicating with the interior thereof, a vapor pipe communicating with the upper portion of the closed tank and with the upper portion of the heating chamber, and means for controlling the flow therebetween in said pipe.

Signed at Cleveland in the county of Cuyahoga and State of Ohio, this 22nd day of June 1905.

CHARLES E. ORD.

Witnesses:

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L. C. MARBACH.