

(No Model.)

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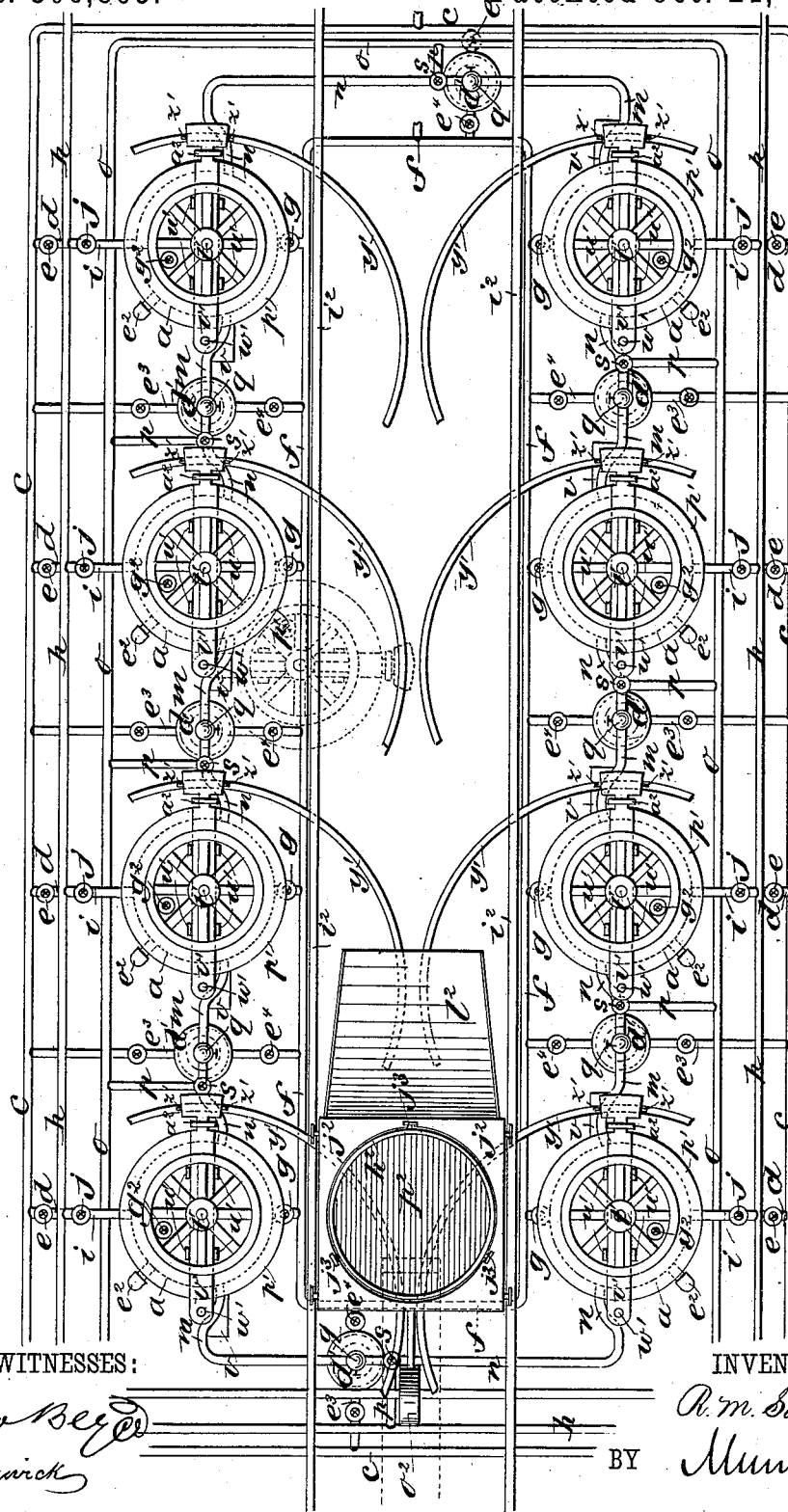
R. M. SANDYS.

DIFFUSING, DEFECATING, AND CIRCULATING APPARATUS.

No. 306,865.

Patented Oct. 21, 1884.

Fig. 1.



WITNESSES:

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INVENTOR:

R. M. Sandys
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Fig. 4.

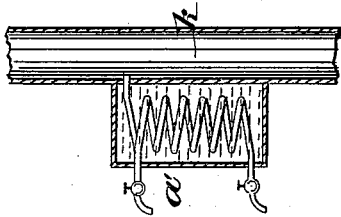


Fig. 3.

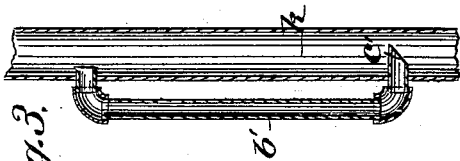
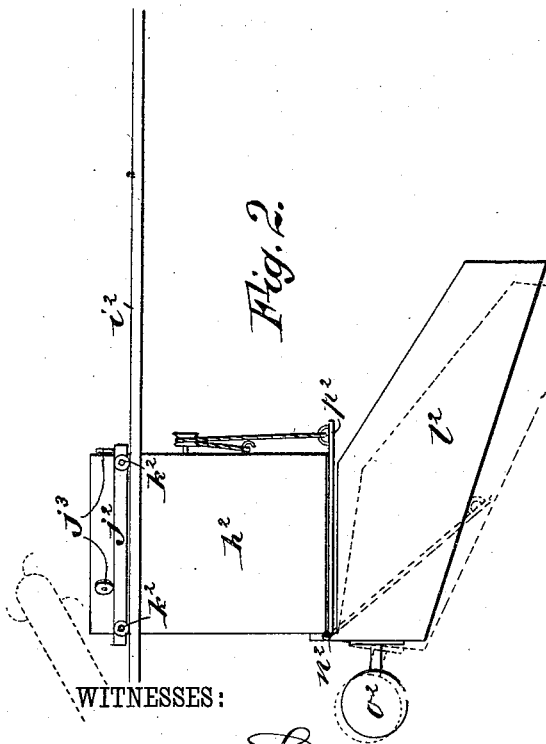
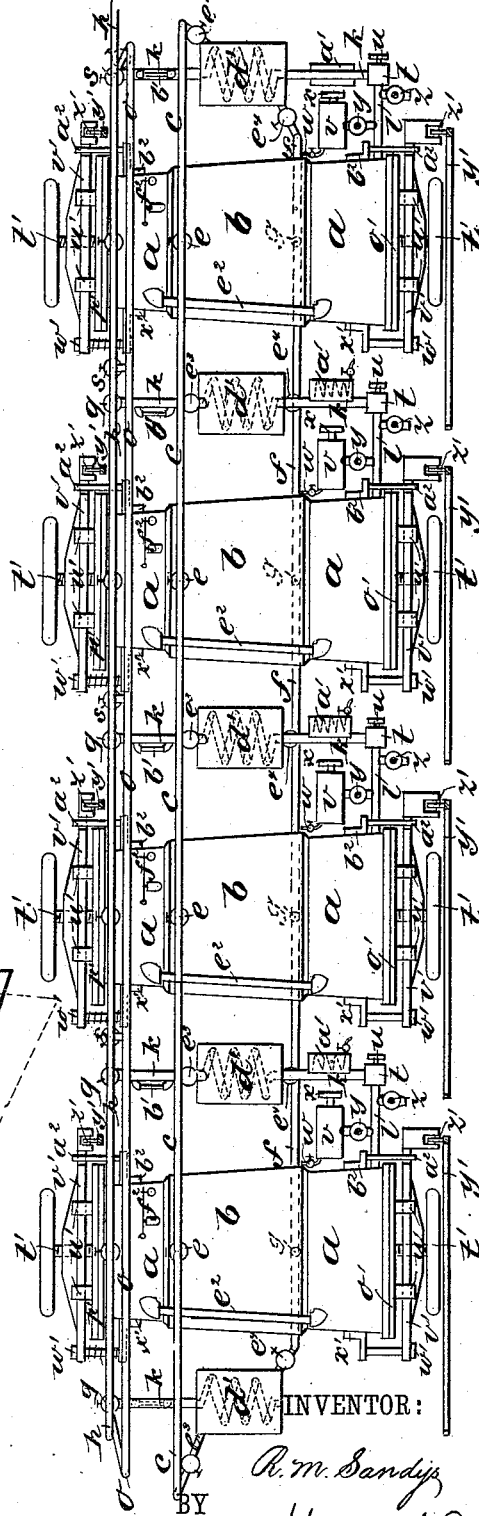


Fig. 2.



WITNESSES:

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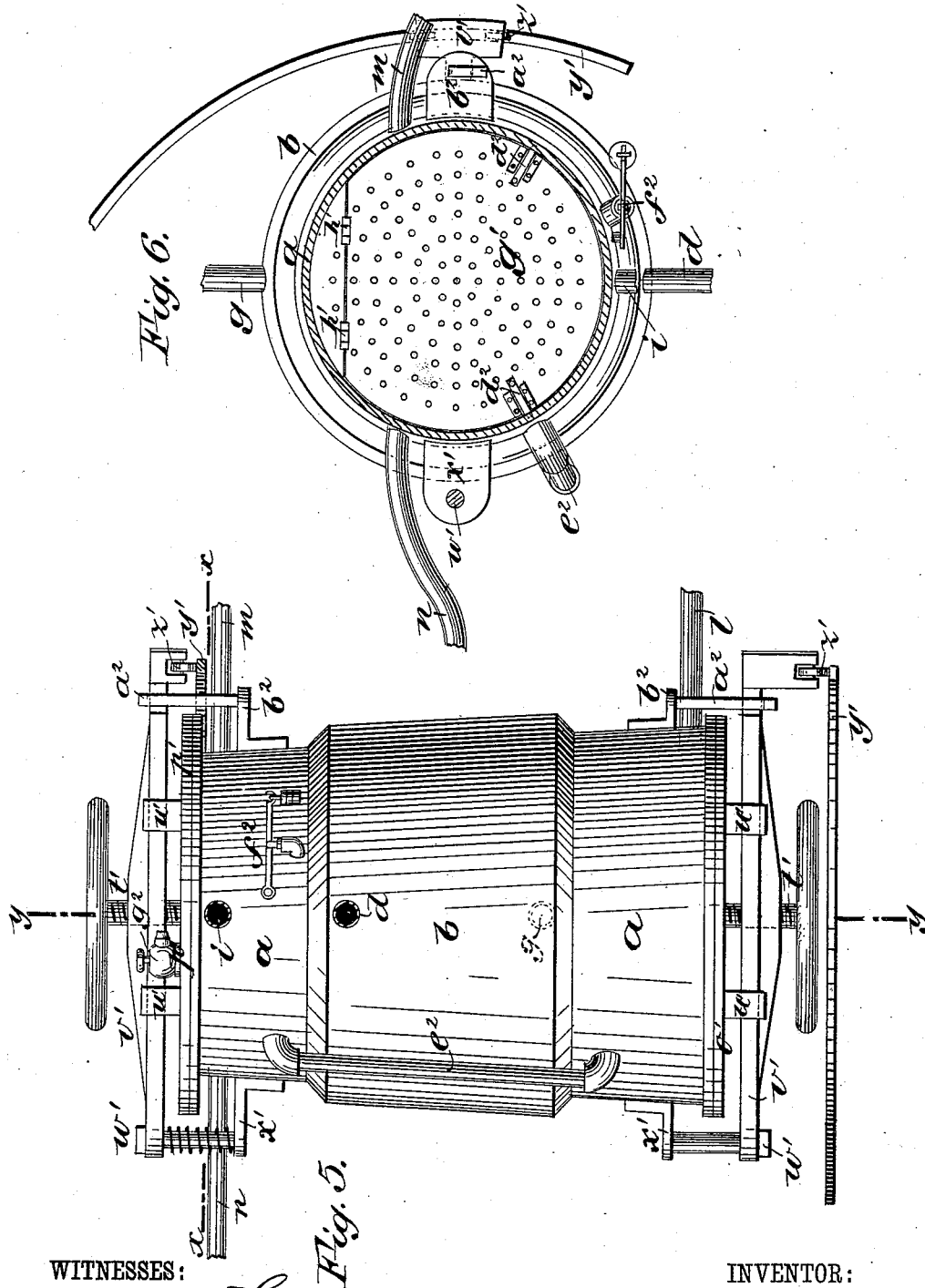
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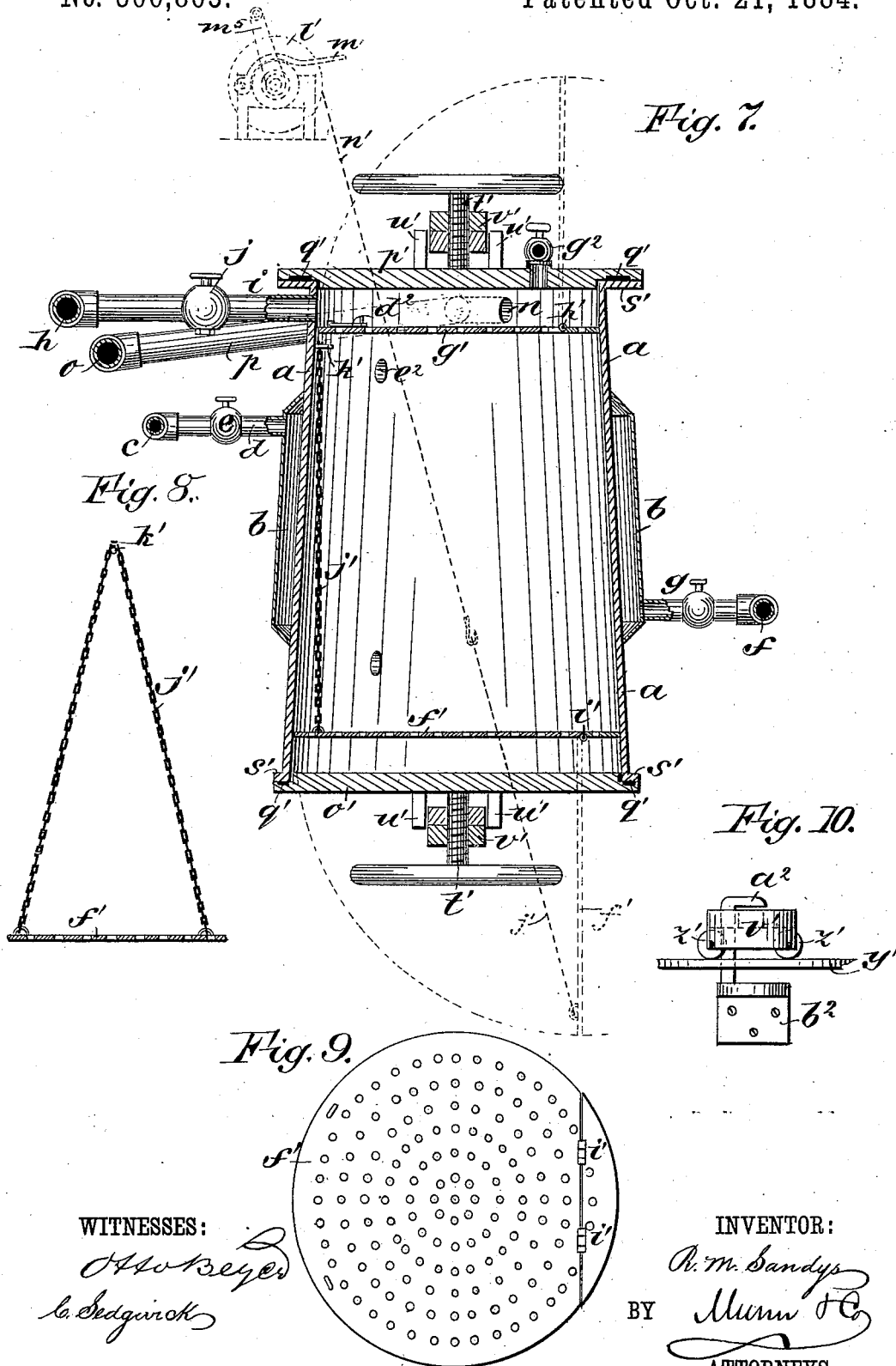
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WITNESSES:

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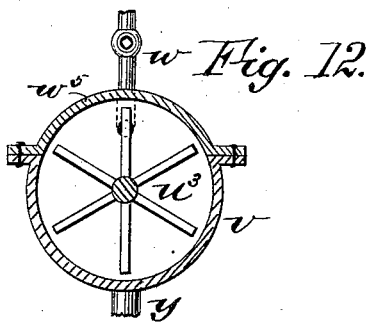
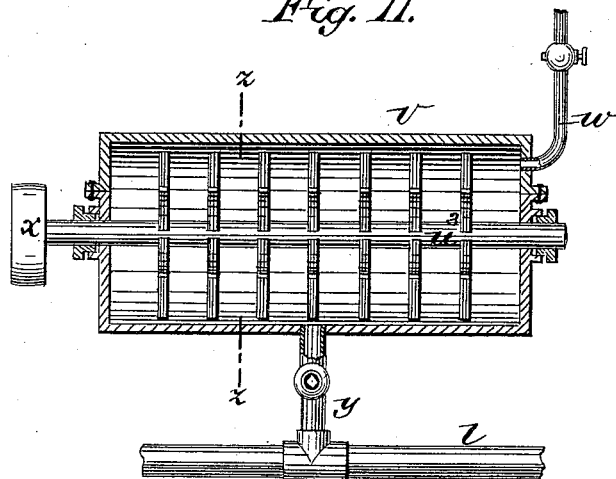
R. M. SANDYS.

DIFFUSING, DEFECATING, AND CIRCULATING APPARATUS.

No. 306,865.

Patented Oct. 21, 1884.

Fig. 11.



WITNESSES:

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UNITED STATES PATENT OFFICE.

REGINALD MELVILL SANDYS, OF NEW ORLEANS, LOUISIANA.

DIFFUSING, DEFECATING, AND CIRCULATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 306,865, dated October 21, 1884.

Application filed December 6, 1883. Renewed September 19, 1884. (No model.)

To all whom it may concern:

Be it known that I, REGINALD MELVILL SANDYS, of New Orleans, in the parish of Orleans and State of Louisiana, have invented a new and Improved Diffusing, Defecating, and Circulating Apparatus, of which the following is a full, clear, and exact description.

My invention relates to apparatus for the treatment of the tropical sugar-cane, the different varieties of sorghum-cane, and the beet-root, and, in fact, to the extraction of juice from plants, for the treatment of the residues from the cane-mill known as "bagasse," of which there are two kinds—cane-bagasse and sorghum bagasse—and also for the treatment of the residue of beet-root known as "pulp;" and the said invention consists of improved arrangements of a system of defecating apparatus for charging the tanks with the material to be treated, means for heating the tanks, apparatus for effecting the circulation of the liquors and introducing the defecating agent, and apparatus for examining the liquor during the operation, and contrivances for opening and closing the tanks to be filled and discharged and for filling the same, all as hereinafter fully described.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of a system of tanks with charging, heating, circulating, and other apparatus and attachments contrived according to my invention. Fig. 2 is a side elevation of the tanks and other apparatus represented in plan view in Fig. 1. Fig. 3 is a detail of the circulating apparatus, showing a contrivance of a sight-glass in the circulating-pipe for inspecting the liquor as it passes along the pipe. Fig. 4 is a detail of a device for extracting samples of liquor from the circulating-pipe. Fig. 5 is a side elevation of one of the tanks and its attachments on an enlarged scale. Fig. 6 is a horizontal section of Fig. 5 on line *x x*. Fig. 7 is a vertical section of Fig. 5 on the line *y y*. Fig. 8 is a detail of apparatus for suspending a perforated plate in the lower end of tank, for retaining the residue while the lower cover is being removed, and for discharging the said residue when the cover is opened. Fig. 9 is a plan

view of said perforated plate. Fig. 10 is a detail of apparatus used in opening and closing the covers. Fig. 11 is a horizontal sectional elevation of the apparatus for introducing the defecating agent for agitating the same. Fig. 12 is a transverse section of the apparatus represented in Fig. 11, taken on the line *z z*.

I arrange a series of tanks, *a*, preferably of slightly-conical form, placed in any desirable position. Each tank may have a steam-jacket, *b*, so connected with a steam-supply by pipes *c*, branches *d*, and cocks *e* that steam may be cut off from any jacket at will, and each steam-jacket is also similarly arranged for clearing it of condensed water by pipes *f* and cocks *g*. The tanks are also connected by a pipe, *h*, for supplying the interior thereof with water, preferably warm water, and said pipe is also suitably arranged with cocks *j* and branch pipes *i*, for controlling the entry of water into any of the said tanks; and the said tanks *a* are also supplied with a circulating-pipe, *k*, connected to the tanks at the top by branches *m* and *n* and two-way cocks *q*, or any suitable arrangement of cocks for controlling and diverting the flow of the liquor, and at the bottom by branches *l*, to which are attached pumps *t* or other devices for passing the water or liquor from bottom to top of said tanks, thereby producing a circulation of the liquor in the interior of the tanks, said pumps *t* having pulleys *u* to drive them; and the said circulating-pipe *k* is so connected with pipes *o* by cocks *s* and branches *p* that the liquor may be emptied at will from one vessel into any of the vessels, or it may be emptied into a receiving-tank through the branch cock *z*.

I attach an agitator of any suitable kind and at any desirable point in my apparatus for maintaining the defecating agent in suspension when necessary. The said agitator may consist of the hollow cylinder *v*, reel *w*, with a pipe and cock, *w*, for the admission of air for displacement, and may be connected with a pipe and cock, *y*, so that the entry of the defecating agent into the liquor may be regulated. The agitator may have a lid, *w*, Fig. 12, for refilling with the defecating or any suitable agent, with a shaft that extends through the end of the cylinder, having a pulley, *x*, driven by a belt. A steam-heater, *d'*, of any

approved construction, and having the necessary supply and discharge pipes, $e^1 e^2$, and the necessary valves, may be connected to the pipe k for heating the liquor during its circulation. A coil, a , may be attached to the circulating pipe k , or at any desirable point in the apparatus, said coil being surrounded with cold water, and provided with cocks, top and bottom, either or both, for extracting samples of the liquor for the purpose of testing; and a sight-glass or other suitable device, b^1 , is attached to the apparatus at any desirable point where there is a circulation of liquor, for the purpose of inspecting the said liquor. The nipple c^1 , connecting the lower end of this gage, extends to the liquor, and is beveled, as is shown in Fig. 3, to catch the flowing liquor and cause a flow through the sight-glass, thus exposing the liquor to view.

The tanks a have a perforated plate, f^1 , near the bottom, and another, g^1 , near the top, inside, between which the disintegrated material is to be confined to strain the liquor and to protect the pipes from choking up by the said material. The upper plate, g^1 , may be hinged, as at h^1 , or in any other suitable manner, so as to open, as indicated by the dotted lines in Fig. 7, when the tanks are to be filled with the material, and is shut down and fastened by slide-bolts d^1 . The lower plate is hinged at i^1 , and is suspended by a chain, j^1 , from a stud-pin, k^1 , or in any suitable manner, below the upper plate while work is in progress.

Above the series of tanks is a drum, l , brake m^1 , and crank handle m^2 , and a chain, n^1 , to hook onto the chain j^1 when the plate f^1 is to be lowered to discharge the contents of the tanks. The tanks a are also provided with removable end covers, o^1 and p^1 , having packing-rings q^1 let into annular recesses, or any other suitable device, to pack against flanges s^1 by screws t^1 , the said covers being connected by these screws and by lugs u^1 with a clamping-bar, v^1 , pivoted at one side of the cover on a stud-pin, w^1 , supported on a bracket, x^1 , or any other device attached to the side of the tank, the said bars being supported at the other end on a curved track, y^1 , by rollers z^1 , to swing round with the covers, so as to open the tanks, and to return them in order to close the tanks to tighten the lids against the flanges, the said screws being revolved so that they press against the cover, causing the cover in turn to press against the flange, the said clamping-bar being held at one end by the stud-pin w^1 and at the other by the hook a^2 on brackets b^2 . The end of the screw t^1 is so arranged, like the screw of a letter-copying press, that by reversing the screw the cover can be lifted clear of the flange.

The tanks are provided with a glass gage, e^2 , safety-valve f^2 , vent cock g^2 , and in practice a thermometer, all of which may be placed in any desired position.

For charging the tanks a with the material to be treated, I provide a hopper, h^2 , or any

other device which may be of sufficient capacity to hold a charge for a tank, the hopper being suspended on the carriage j^2 by wheels j^1 , and the carriage in turn being placed on wheels k^2 on the track i^2 . If so desired, the hopper may be moved backward or forward along the track or revolved around the carriage at will, so as to direct the spout l^2 toward any of the tanks a . The material to be treated may be carried into the hopper by an endless chain of buckets, or in any other suitable manner. The spout l^2 is suspended from the lower end of the hopper by hinges n^2 , or by any other device, and is counterbalanced by a weight, o^2 , or any suitable device, that raises the delivery end of the spout clear of the top gear of the tanks when the spout is not discharging, but allowing the weight of the charge to drop the end of the spout down toward the mouth of the tank, when the gate p^2 at the bottom of the hopper is opened to let the charge fall.

Using any known defecating or purifying agent—such as the alkalies, lime, &c., or carbonates, or any other desirable agent—the mode of operation is as follows: Fill the tanks a between the perforated plates f and g^1 with the material to be treated. To the first of the series add water (water heated to 60° centigrade preferred) in quantity as may be desired, opening at the same time the vent-cock g^2 at the top. When sufficiently full of water, shut the vent-cock, and set the circulating pump in motion as long as considered desirable, adding a defecating or other suitable agent in sufficient quantity, if required, by means of the agitator. When this operation is completed, which may be determined by tests made of the juice taken through the coil a^1 , pass the liquor or juice from the first into the second tank by the circulating pump or other device, and add water again to the first, and repeat the operation; pass the liquor from the second to the third tank, and from the first to the second, and so on, maintaining the liquors at any desired temperature by means of the heater d^1 or steam-jacket b , or by both, if desired. When the last vessel of the series is reached, I prefer to increase the heat of the liquor inside that vessel, in order to precipitate all the precipitable matter possible, without decreasing the purity of the liquor, and adding a suitable amount of defecating agent, if required. All this can be determined by testing the liquor from time to time. Then empty the said liquor into suitable tanks suitably connected to the discharging-cock z . The first tank then contains material that has undergone eight washings, if eight vessels have been used; but it may not always be considered necessary to wash the material the same number of times as the number of tanks used.

I may prefer to operate this apparatus with the circulating device, and without the use of any chemical agent or without the application of heat.

I am aware that it is not new, broadly, to

employ a series of tanks connected to a common circulating-pipe adapted to effect the action of any two or more of the tanks at the same or different times; to employ in connection with the tanks reheating devices; to feed the material to the tanks by a chute depending from an open receptacle adapted to permit the shifting or moving of the chute so as to direct the material into the desired tank, and to employ a top and a bottom diaphragm, the former being removable.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with the series of tanks *a* and the circulating-pipes and branches connecting them, of the agitator *v w* between each tank, substantially as described.

2. The sight-tube, in combination with each tank, substantially as described.

3. The sampling-coil contrived with each tank, substantially as described.

4. The combination, with the tank *a*, of the heater *d'*, with a pipe passing tortuously through it, and connected to and intermediately between sections of the pipe *k*, connected by pipe-connections to the top and bottom of the tank, substantially as and for the purpose set forth.

5. The combination, with the tanks *a*, of the circulating pipe *o*, connected by branch pipes *p* to pipes *k*, having cocks, and connected to said tanks by branch pipes *m n*, having cocks, substantially as and for the purpose set forth.

6. The combination, with the tanks *a*, of the circulating-pipe *o*, connected by branch pipes *p* to pipes *k*, having cocks, and connected to said tanks at the top by branch pipes *m n*, having cocks, and to the bottom of said tanks by pipes *l*, substantially as and for the purpose set forth.

7. The combination, with the tanks *a*, of the circulating-pipe *o*, connected by branch pipes *p* to pipes *k*, having cocks, and connected to said tanks at the top by branch pipes *m n*, having cocks, and to the bottom of said tanks by pipes *l*, having pumps *t*, substantially as and for the purpose set forth.

8. The combination, with the tanks *a*, having the surrounding steam-jackets *b*, of the continuous pipe *f*, connected to said jackets by pipes *g*, having cocks, substantially as and for the purpose set forth.

9. The combination, with the tanks *a*, having the surrounding steam-jackets *b*, of the continuous pipes *f* and *c*, connected to said jackets by pipes *d* and *g*, having cocks, substantially as and for the purpose set forth.

10. The combination, with the tanks *a*, of the pipes *k*, connected thereto at the top by branch pipes *m n*, and at the bottom by the pipes *l*, and agitators *v w*, having pipes and cocks *w y*, connected to pipes *l*, substantially as and for the purpose set forth.

11. The combination, with tanks *a*, having the steam-jackets *b*, of the circulating-pipe *o*, connected by branch pipes *p* to pipes *k*, connected to the tanks at the top by the branch

pipes *m n*, and at the bottom by pipes *l*, the pipes *f c*, connected to said steam-jackets by branch pipes *g d*, and water-pipes *h* connected by branch pipes *i* to the tanks *a*, substantially as and for the purpose set forth.

12. The combination, with the tanks *a*, of the pipes *k*, connected thereto by branch pipes *m n* and pipes *l*, and having the liquid-viewing tubes *b'*, substantially as and for the purpose set forth.

13. The combination, with the tanks *a*, of the pipes *k*, connected thereto by the branch pipes *m n* and pipes *l*, and the liquid-viewing tubes *b'*, with their lower ends provided with bevel-ended nipples *c'* extending into the pipes *k*, substantially as and for the purpose set forth.

14. The tanks *a*, having perforated plates to be opened and closed for charging and discharging the tanks, said plates being hinged, and the upper one having sliding bolts, and the lower one being suspended by a chain, substantially as described.

15. The combination of the chain-drum, brake, and crank for lowering the lower perforated plate, substantially as described.

16. The tanks *a*, having covers and being connected with clamping-bars *v'*, and provided with screws, the said bars being arranged on pivot-studs *w'* and curved track *y'*, and having retaining-hooks *a''*, or other suitable device, substantially as described.

17. The tanks *a*, having covers and being connected with clamping-bars *v'*, and provided with screws *t'*, said bars being arranged on pivot-studs *w'*, and having rolls *z'*, traveling upon a curved track *y'*, and having retaining-hooks *a''*, substantially as and for the purpose set forth.

18. The hopper *h''*, having the counterbalanced hinged chute *l'*, substantially as and for the purpose set forth.

19. The hopper *h''*, having the chute *l'*, hinged at its upper rear edge to the lower rear edge of said hopper, and provided at its rear end with a counterbalancing-weight, *o''*, substantially as and for the purpose set forth.

20. The hopper *h''*, having the hinged bottom *p''* and the hinged counterbalanced chute *l'*, substantially as and for the purpose set forth.

21. The traveling hopper *h''*, having the hinged counterbalanced chute and the hinged bottom, in combination with the tanks *a*, substantially as and for the purpose set forth.

22. The combination, in a diffusing, defeating, and circulating apparatus, consisting, essentially, of a series of tanks, *a*, with heating apparatus and circulating-pipes, of a pump connected with the circulating-pipes between each of the tanks, to produce the circulation of the liquor, substantially as described.

23. The sight-tubes *b'*, connected to the circulating-pipes between the tanks, and having an inwardly-projecting nipple, *c'*, to cause a flowing stream through said tubes, substantially as described.

24. The combination, in a diffusing, defe-

eating, and circulating apparatus, of the circulating-pipe *c*, connected to the steam-jackets *b* of the tanks, and the additional circulating-pipe *o*, with the tanks *a*, and circulating-pipe *k*, connected to the tanks by branch pipes *m n*, and to the pipe *o* by branch pipes *p* and cock *s*, substantially as and for the purpose set forth.

25 25. The tanks *a*, having perforated plates *f'* and *g'*, in combination with removable covers, said plates being arranged on hinges, and the upper plate having sliding bolts and the lower plate being suspended by a chain, substantially as described.

10 26. The tank-covers having packing-rings *q'*, and being connected to swinging bars *v'*, and provided with a clamping-screw, *u'*, said bars being arranged on pivot-studs *w'* and rails *y'*,

and having retaining-hooks *a'*, substantially as described. 20

27. The traveling hopper *h'*, in combination with the series of tanks *a*, said hopper being arranged on a carriage, *j'*, of an elevated track, *i'*, and having a gate, *p'*, and hinged and counterbalanced spout *l'*, substantially as described. 25

28. In a diffusing apparatus having a series of tanks, *a*, arranged in any desired position, the hopper *h'*, having gate *p'* and spout *l'*, and being arranged to revolve on the carriage *j'*, by which it is suspended from the elevated track *i'*, substantially as described. 30

REGINALD MELVILL SANDYS.

Witnesses:

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