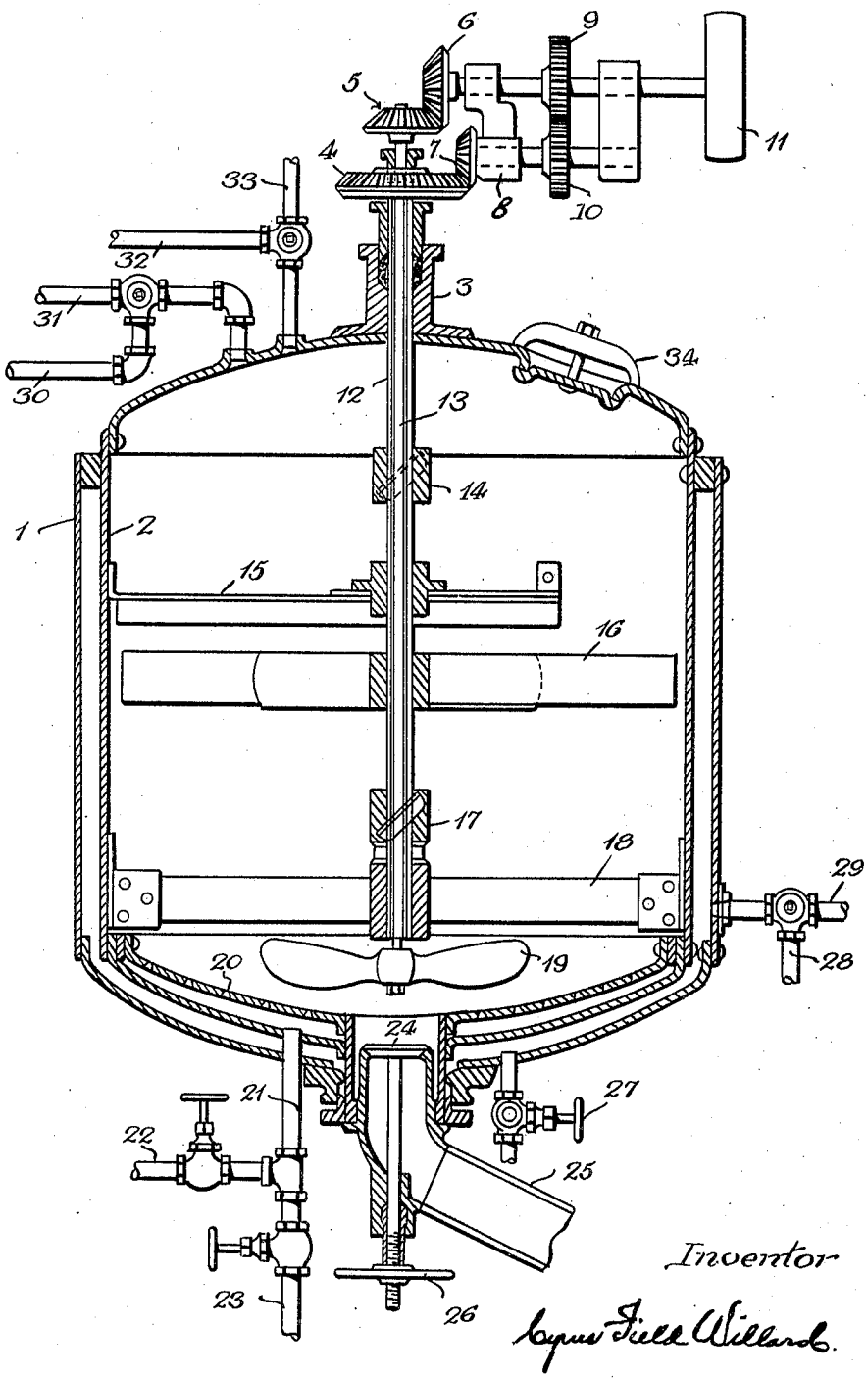
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C. F. WILLARD

DEVULCANIZING KETTLE

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Inventor

Cyrus Field Willard.

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CYRUS FIELD WILLARD, OF SAN DIEGO, CALIFORNIA.

DEVULCANIZING KETTLE.

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My invention relates to improvements in devulcanizing kettles, especially those which are steam-jacketed and used in the devulcanizing of rubber, in rubber reclaiming plants, as well as kettles used in chemical industries for other products, where it is necessary to wash the material after it has been treated in order to obtain a clean product.

The objects of my improvements are to secure a more thorough agitation, insuring a better treatment of material, as well as to permit the treated material to be washed in the same vessel in which it has been treated, thus saving the time lost in "dumping" the charge and conveying it elsewhere to be washed, eliminating the expensive labor-cost resulting therefrom, saving the solvents or wash solutions employed, if desired, as well as producing a better and cheaper product generally.

I attain these objects by the mechanism illustrated in the accompanying drawing in which the figure shown, Fig. 1, is a vertical section of the steam-jacketed kettle with connections and pipes shown in the perspective.

1 is the outer shell of the steam-jacketed kettle, 2 is the inner shell and 3 is the stuffing box and bearing on top of the kettle through which passes the low-speed quill shaft 12 inside of which is the high-speed shaft (13) to which is attached at its lower end the high-speed propeller 19, which revolves in the opposite direction to that in which the paddles 14, 16 and 17 are turning. The low-speed bevel gear 4 actuates the low-speed quill shaft 12, while the high-speed bevel gear 5 actuates the high-speed shaft 13.

The high-speed bevel pinion 6 meshes into and turns the high-speed gear 5 while the low-speed bevel pinion 7 meshes into and turns the low-speed bevel gear 4. 8 is the bearing in which turns the shafts on which the pinions 6 and 7 are mounted while 9 is a differential gear and 10 is a differential pinion on small shaft turning in suitable bearing while 11 is the drive pulley furnishing the power actuating the differential gear 9 which in turn moves the differential pinion 10 to drive the low-speed bevel pinion 7 and bevel gear 4 to turn the low-speed quill shaft 12. The bearing bracket 15 supports the low-speed quill shaft 12 containing inside the high-speed shaft 13 and to this quill shaft 12 are fixed the rigid paddles 14, 16 and 17. The paddle 14 may have a tilt downward for the purpose of driving the suspensoid material downward while being agitated and the paddle 17 may be given a tilt upward so as to drive the suspensoid material upward as it is being agitated, while the paddle 16 revolves in a plane at right angles to the low-speed shaft 12. 18 is the lower bearing for quill shaft 12 and attached to the lower end of the high-speed shaft 13 is the high-speed propeller 19 revolving in the opposite direction to the paddles 14, 16 and 17. 20 is the perforated false bottom and 21 is a wash solution intake pipe penetrating the inner shell to just below the perforated false bottom to permit the introduction of a wash solution under pressure just below this perforated false bottom 20, through the wash solution pipe 22. 23 is a solution drain pipe to drain off all solutions from the material without dumping. 24 is the main outlet valve and 25 is the main discharge pipe by which to discharge charge after it has been treated and thoroughly washed. 26 is the main outlet valve operating wheel and 27 is the steam-jacket drain line. 28 is the steam-jacket inlet line and 29 is the steam-jacket cold water connection. 30 is the steam inlet to inner shell, and 31 is cold water inlet to inner shell. 32 is an inlet for devulcanizing mixture, 33 is an inlet for volatile solvents and 34 a "manhole" or main loading inlet to inner shell.

It is obvious that when the kettle is loaded at the manhole 34 with the proper amount of old rubber scrap and water is supplied in the proper proportions through the cold water inlet 31, and devulcanizing mixture is added as desired through 32 and 33, that the kettle is charged and ready to operate. This operation begins by the introduction of steam into the steam-jacket through steam jacket inlet line 28 and also steam into the interior of the kettle through steam inlet 30. Power is applied through the pulley 11 which in turn actuates the differential gear 9 and the differential pinion 10 which latter transmits its power to the low-speed bevel pinion 7 which actuates the low speed bevel gear 4 which actuates the low-speed quill shaft 12 which carries the fixed paddles 14, 16 and 17 and causes these paddles to revolve in one direction and at the same time drive the material down and lift it up from the bottom, while the high-speed propeller 19 is revolved in the opposite direction at a high rate of speed by the inner high-speed

shaft 13 actuated by the bevel gear 5 receiving its power from the bevel pinion 6, mounted on the same shaft as differential gear 9 and the drive pulley 11. This revolution of the high-speed propeller in the opposite direction to the low-speed paddles produces a violent agitation in the liquid contents of the kettle and especially in the bottom of the kettle where it is most needed and particularly when the water level is being lowered by the devulcanizing solution being drawn off through the drain pipe 23. After the rubber has been in the devulcanizing solution the required length of time and is devulcanized and it is desired to draw off the devulcanizing solution and wash the treated material, the valve on drain pipe 23 is opened and the devulcanizing solution is drawn off while the propeller is operating when draining, leaving the devulcanizing treated material resting on the false bottom in a more or less packed condition, such as filter beds become. The washing solution is introduced, under pressure, by opening the valve in wash solution pipe 22 which immediately lifts up the packed material on the false bottom 20 until the proper amount of wash solution is introduced and the treated materials have become suspensoids in the wash solution. The power is then started again and a thorough and complete washing is given the material by the violent agitation given to the solution by the high-speed propeller and the low-speed paddles turning in opposite directions. Power is again shut off and this wash solution is drawn off through pipe 23, which may have on its line several valves to shunt off the various solutions into different tanks, and cold water and steam is introduced again through 30 and 31 and the material washed thoroughly in clean water, being again agitated by the power-driven high-speed propeller and low-speed paddles working in opposite directions and left to drain, after which the washed material is discharged in a clean water suspension through main discharge pipe 25 by opening main outlet valve 24 operated by wheel 26. The washed material in suspension may be discharged into a revolving, inclined screen of any desired mesh which separates the liquid from the clean, treated solid material which is then conveyed to the driers.

It is obvious, also, that my improvements may be used on electrically heated kettles, without steam jackets, where electric space heaters may be used, applied directly to the inner shell, to heat the solution contained in the kettle, and hence my claims cover such use.

Such steam-jacketed kettles with ordinary agitating paddles have been in common use for years and hence I make no claim to any such form of kettle or the ordinary agitation paddles, as part of my invention. The novel features of my improvement are embodied in the quill shaft bearing the three paddles turning in one direction with the high-speed propeller and inner shaft turning in an opposite direction and taking its power off the same drive pulley as the low-speed quill shaft, which paddles are tilted to drive the material down from the top and lift it up from the bottom, also the perforated false bottom with the pipe connections, permitting the draining off of the liquid used in treating material from the solid treated material and introducing through the same pipe, beneath the packed material on the perforated false bottom, a washing solution which may also be drained off, and means for introducing clean water and steam into the inner portion and washing the treated material. This wash solution may also be drawn off through drain pipe, and cold water connection into the steam jacket may also be used to cool down charge quickly and give a better "fiber" to rubber so treated. Such are the new and useful improvements which I specify as my invention, disclaiming any intent to cover the known features shown in drawing.

Having described my invention, what I claim is:—

1. A kettle devised to treat material chemically in any desired way and to wash the material which has thus been treated therein in the same vessel without dumping the treated material, with means for supplying treating solution, with heat and under pressure, means for agitating material during treatment and washing, means for supplying and removing wash solution as desired and means for dumping the material so that it may be treated and washed in the same vessel.

2. A steam-jacketed kettle wherein is treated chemically any desired material and wherein the material so treated is washed in the same kettle without dumping, with means for supplying treating solution, with heat and under pressure, means for agitating material during treatment and washing, means for supplying and removing wash solution as desired, and means for dumping charge after washing, so that the material may be treated and washed in the same kettle.

3. A steam-jacketed devulcanizing kettle wherein ground rubber scrap is devulcanized and the devulcanized rubber scrap is washed in the same kettle after being devulcanized without dumping the charge, with means for supplying the necessary devulcanizing solution, with heat and under pressure, means for agitating the material during devulcanizing and washing, means for transmitting power for the same, and means for supplying and removing wash solution

as desired, means for quickly cooling charge, and means for dumping the charge after it has been devulcanized and washed in the same kettle.

4. In a steam-jacketed devulcanizing kettle, the combination, with a kettle of ordinary form, of pipe and connections for introducing devulcanizing solutions, with heat and under pressure, steam and water pipe and connections into interior shell, a hollow low-speed quill shaft and paddles which revolve in one direction, a high-speed shaft inside the low-speed quill shaft, and a high-speed propeller on high-speed shaft revolving in opposite direction, suitable power transmission devices for actuating the two shafts simultaneously at different rates of speed in opposite directions, the perforated false bottom, the drain pipe to drain off all liquid solutions located beneath the perforated false bottom, the wash solution pipe connected in such a way as to permit the wash solution to be introduced, beneath the material resting on the perforated false bottom, to wash the treated material and then permitting the wash solution to be withdrawn, pipe and connections for introducing steam and cold water into the steam jacket, and means for dumping the charge after it has been treated and washed.

5. In a devulcanizing kettle the combination with the kettle of a low-speed quill shaft bearing paddles rigidly fixed thereto, with the high-speed shaft inside the quill shaft and a high-speed propeller moving in an opposite direction to the paddles on the quill shaft and suitable power devices for actuating the same.

6. In a devulcanizing kettle, the low-speed quill shaft with paddles rigidly attached thereto, the upper one of which is tilted to drive material downward and the lower one tilted to lift material upward in combination with the high-speed shaft inside the hollow quill shaft and the propeller revolving at a high rate of speed and in an opposite direction to the paddles on the low-speed quill shaft, all for the purpose specified.

7. In a devulcanizing kettle, a perforated false bottom with pipe and connections for draining all liquid solutions from the treated material in combination with pipe and connections for introducing wash solution under the perforated false bottom for the purpose of washing the treated material and means for agitating thoroughly such material while being treated and washed, and means for discharging the washed material from the kettle in which it has been treated and washed.

8. In a devulcanizing kettle, the combination of the perforated false bottom, with pipe and connections for draining all liquid solutions from the treated material, pipe and connections for introducing wash solutions underneath the perforated false bottom, a low-speed quill shaft and paddles revolving in one direction, a high-speed shaft inside quill shaft and propeller revolving in the opposite direction, with suitable power devices for actuating both shafts to agitate the material in the kettle, means for supplying water and heat, means for supplying the necessary treating solution to the material to be treated and means for emptying the kettle of the material which has been treated and washed therein.

CYRUS FIELD WILLARD.