May 28, 1963 C. O. FINN 3,091,436

METHOD FOR PRODUCING A SPRAYABLE FIBRE MULCH

Filed June 17, 1960 4 Sheets-Sheet 1

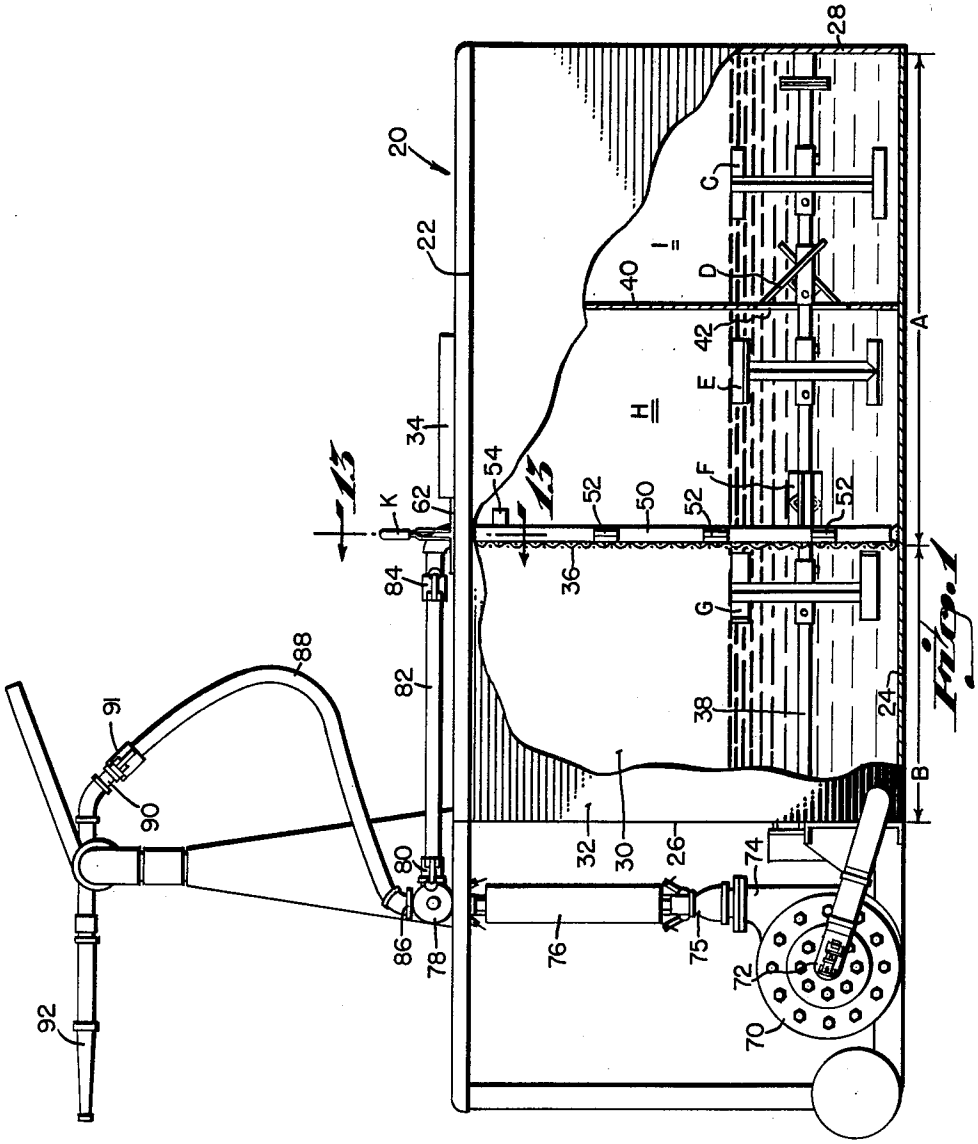


Fig. 1

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Filed June 17, 1960 4 Sheets-Sheet 2

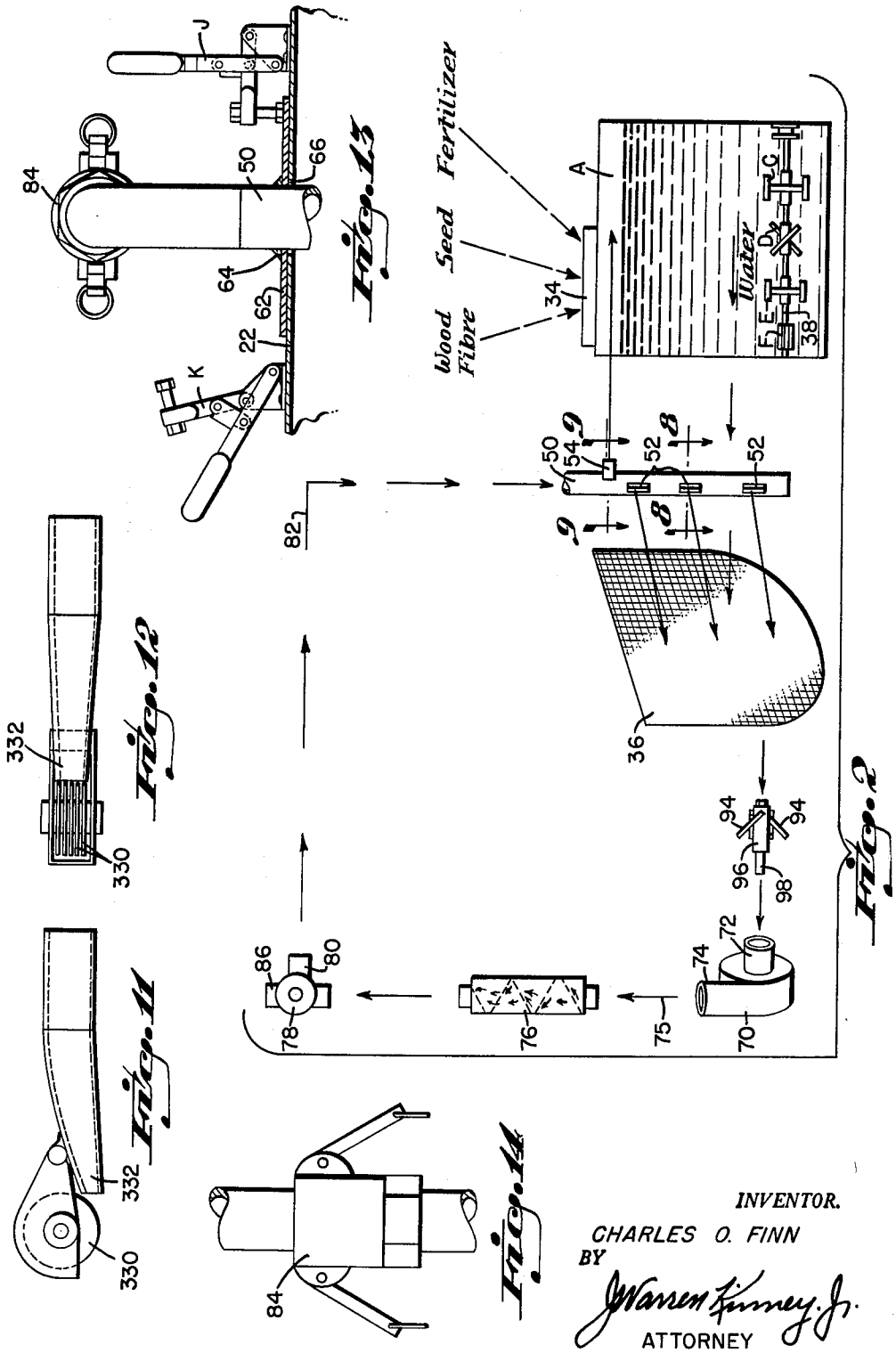


Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

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METHOD FOR PRODUCING A SPRAYABLE FIBRE MULCH

Filed June 17, 1960 4 Sheets-Sheet 3

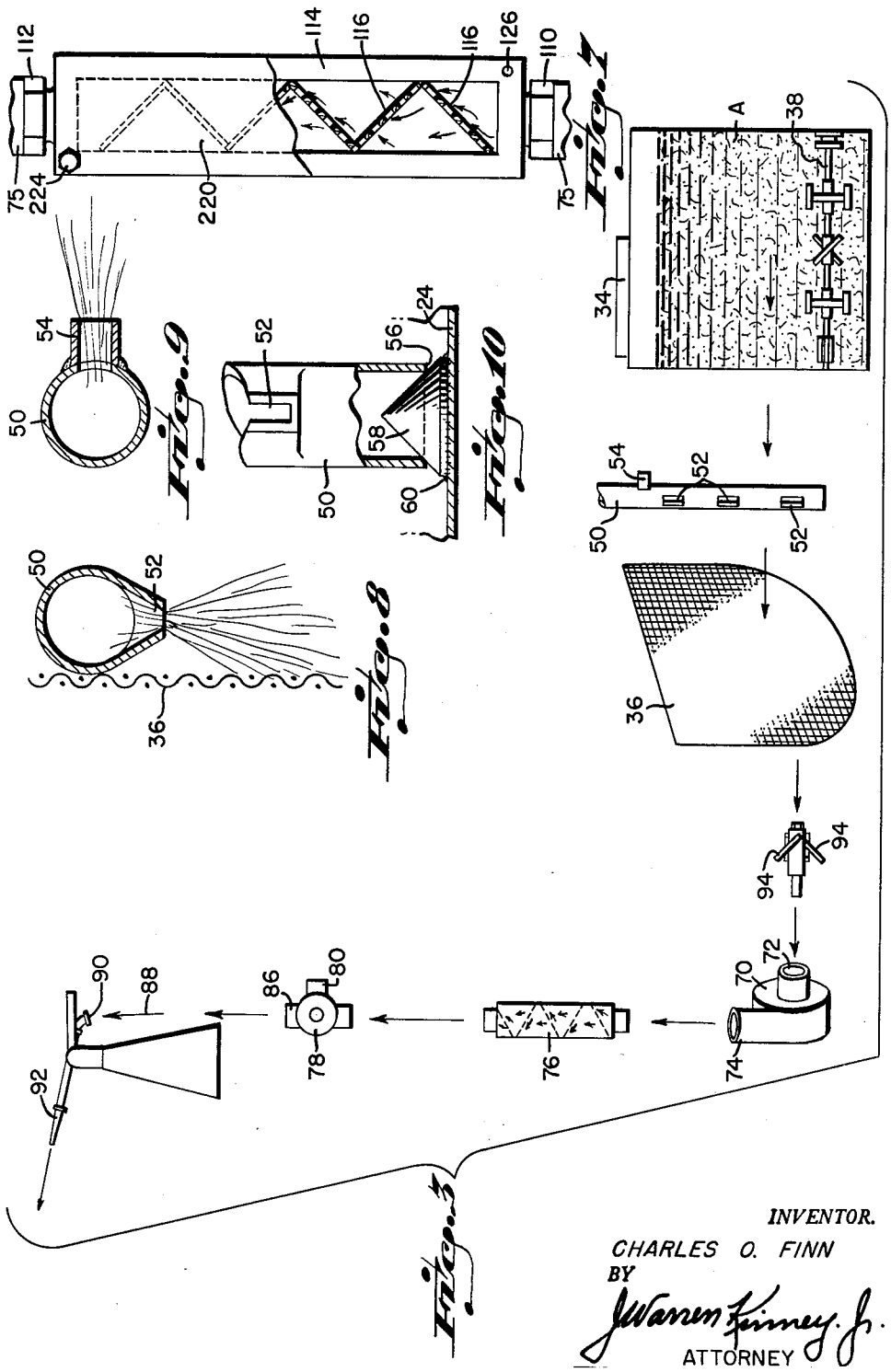


Fig. 1
Fig. 9
Fig. 10
Fig. 8
Fig. 3

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METHOD FOR PRODUCING A SPRAYABLE FIBRE MULCH

Filed June 17, 1960 4 Sheets-Sheet 4

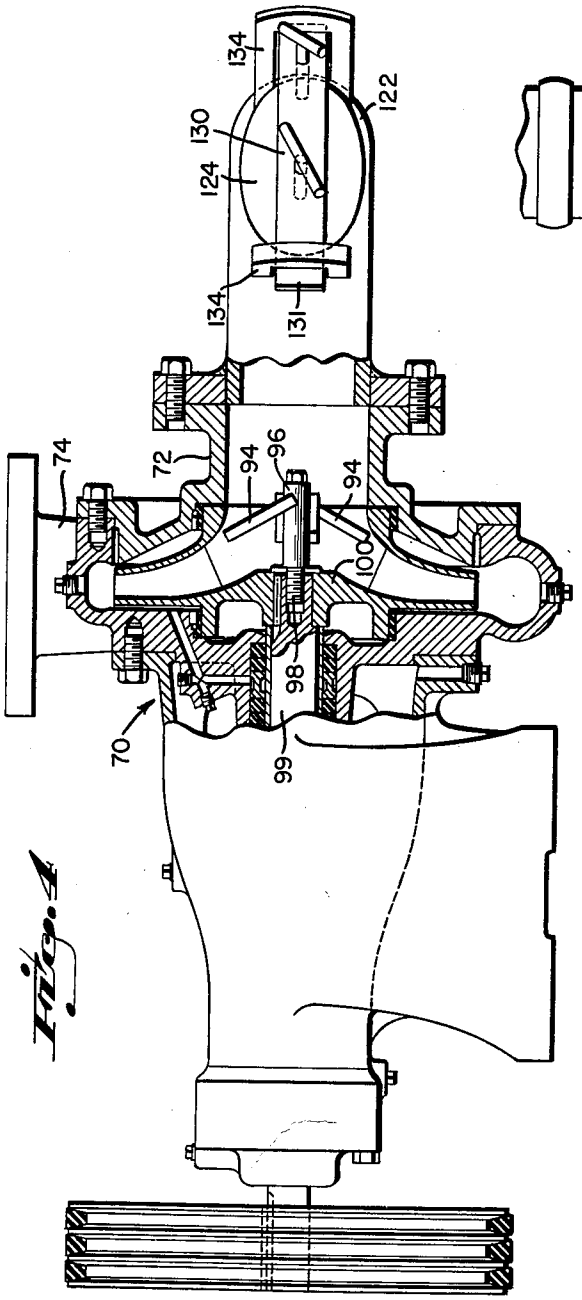


Fig. 4

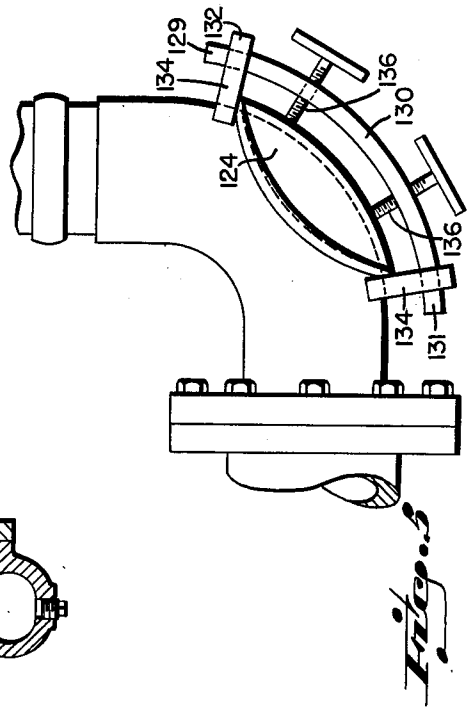


Fig. 5

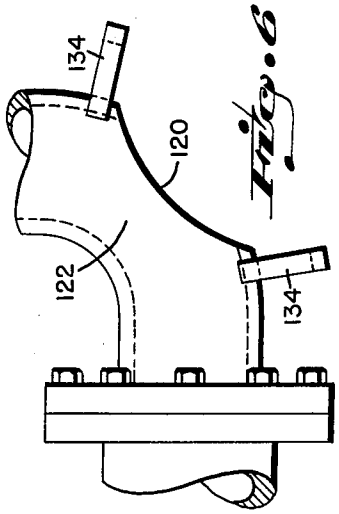


Fig. 6

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METHOD FOR PRODUCING A SPRAYABLE FIBRE MULCH

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3 Claims. (Cl. 259—95)

This invention relates to a method of preparing a sprayable mulch which basically comprises an aqueous dispersion of fibres such as, by way of example, wood pulp to which other ingredients such as seed, fertilizer and/or asphalt may be added.

A prime object of the present invention is to provide a method of quickly separating or disintegrating the fibres of commercially available compacted fibrous material such as wood pulp into individual fibres in the presence of water and of maintaining them in suspension in a thoroughly dispersed condition, whereby to provide a pumpable and sprayable slurry which is characterized by a large percentage of fibre solids.

The term "commercially available compacted fibrous material" refers to substances such as, by way of example, wood pulp from which sufficient water has been removed to provide a product dry to the touch which may be baled, bagged or handled in bulk for storage and transportation. The individual fibres are interlocked and intertwined with other fibres whereby the commercially available product ranges in consistency from dried cow dung, in lump or chunk form, to compacted freshly sheared, burr-infested wool.

A further object of the invention is to provide a unique method of making a slurry in a mixing chamber which includes a recirculating manifold in conjunction with a perforate barrier for further effecting disingration and separation of the fibres.

These and other objects are attained by the means described herein and as disclosed in the accompanying drawings, in which:

FIG. 1 is a fragmentary side view of an apparatus embodying the teachings of the present invention.

FIG. 2 is a schematic diagram illustrating the charging cycle of the apparatus of FIG. 1.

FIG. 3 is a schematic view illustrating the discharge cycle of the apparatus of FIG. 1.

FIG. 4 is a view, partly in section, of the pump assembly comprising a detail of the invention.

FIG. 5 is an enlarged view disclosing the clean-out plate adjacent the pump intake.

FIG. 6 is a view similar to FIG. 5 illustrating the relationship of the parts with the clean-out opened.

FIG. 7 is a side view, partly in section, of a comb strainer comprising a detail of the invention.

FIG. 8 is a sectional view taken on line 8—8 of FIG. 2.

FIG. 9 is a sectional view taken on line 9—9 of FIG. 2.

FIG. 10 is an enlarged view, partly in section, disclosing a detail of the mounting of the manifold.

FIG. 11 is a side view of a modified form of nozzle.

FIG. 12 is a bottom view of the nozzle of FIG. 11.

FIG. 13 is a sectional view taken on line 13—13 of FIG. 1.

FIG. 14 is an elevational view of a typical quick connect-disconnect coupling as used in the hydraulic circuit of the present device.

With reference now to FIG. 1, the numeral 20 denotes generally a closed chamber, or tank, having top, bottom, front, rear and side walls 22, 24, 26, 28, 30 and 32, respectively, wherein access to the interior thereof is controlled by means of a hatch or access door 34.

A perforate barrier 36 subdivides the interior of the chamber or tank into zones A and B wherein zone A may be considered as a mixing chamber, and zone B a suction chamber. Uniformly satisfactory results have been obtained in those instances wherein the barrier has been fabricated from expanded metal in the form of a diamond mesh having openings therein approximateing 1½ by ¾ inch. From the foregoing it will be noted that zones A and B are normally in open communication with one another via the perforate barrier.

Suitable agitator means are provided in the lower portion of the chamber, said means comprising, by way of example, a rotatable shaft 38, suitably journaled and carrying various types of blades or paddles arranged generally as illustrated and denoted by the letters C, D, E, F and G, it being noted that most of the agitating means are disposed within the mixing chamber, or zone A for reasons hereinafter more fully made apparent.

The numeral 40 denotes a bulkhead which subdivides zone A into sub-zones H and I. The use of such a bulkhead is optional since excellent commercial results have been obtained whether it is or is not utilized. Said bulkhead is provided with several large openings, one of which is indicated at 42, for providing open communication between zones H and I.

An elongate manifold 50 is provided in zone A closely adjacent or abutting that face of the perforate barrier 36 which is adjacent zone A. The manifold is provided with a plurality of nozzles 52 each of which is, as best illustrated in FIGS. 1 and 8, arranged to discharge the contents of the manifold directly onto and across that surface or face of the perforate barrier 36 which is adjacent zone A. Manifold 50 is also provided with a nozzle 54 adjacent its upper end, which nozzle is constructed and arranged whereby to direct a flow of material from the manifold across the upper portion of zone A beneath hatch 34.

As best illustrated in FIG. 10, manifold 50 may comprise a length of pipe having nozzles 52 and 54 formed therein, and wherein the open lower end 56 of the pipe is adapted to be received and centered on a conical element 58 suitably secured such as by welding 60 to the bottom 24 of the chamber or tank 20. As best illustrated in FIG. 13, the upper end of manifold 50 is provided with a radially extending plate 62 permanently affixed to the manifold, such as, by way of example, welding 64. Manifold 50 is adapted to be inserted downwardly through aperture 66 provided in the top wall 22 of the chamber, and when the free lower end thereof has been received on member 58, the manifold may be securely though releasably anchored in place by means of latching elements J and K.

An impeller type pump 70 having an intake 72 and an outlet 74 may be utilized for continuously withdrawing or sucking the contents of zone B and forcing same upwardly through a riser conduit 75, comb strainer 76, thence to a three-way valve 78.

One port 80 of the valve may be connected by means

of conduit **82** to the upper end of manifold **50** by means of the quick connect-disconnect coupling **84**, whereas port **86** of the valve may be connected by means of flexible conduit **88** to the intake **90** of nozzle **92** by means of the quick connect-disconnect coupling **91** (FIG. 1).

With reference now to FIG. 4, the numerals **94** denote flails or auxiliary beater arms which are secured to and carried by a stud **96** which has a threaded end **98** adapted to engage the internally threaded end portion of the pump impeller shaft **99** to which impeller **100** is fixed in driving relationship. As clearly illustrated in FIG. 4, flails **94** are disposed within the intake or inlet of pump **70** in such a manner as to effectively act upon any and all material passing through the pump inlet.

Mode of Operation

The apparatus is operated in the following manner to create a sprayable fibre mulch from compacted fibrous material:

First, a quantity of water, such as illustrated in FIG. 1, is placed in chamber **20**, after which the impeller shaft **38** is rotated and the pump started with the three-way valve adjusted whereby the pump discharge will pass through conduit **82**, thence downwardly through manifold **50** whereby to be partially discharged through nozzle **54** across and beneath hatch **34** and against and across perforate barrier **36**, as in the charging cycle of FIG. 2.

As additional water is being added to the chamber, quantities of compacted fibrous material is added to the container through hatch **34**, it being noted that the compacted fibrous material will be initially wetted by reason of being contacted by the stream of fluid emanating from nozzle **54**. The wetted compacted fibre material will drop into the water within zone A where it will be subjected to a fibre separating and disintegrating action. At all times there will be a flow of the mixture in zone A to zone B through the perforate barrier **36** by reason of the action of pump **70**. Those compacted portions or clumps or lumps of the compacted fibrous material which would normally adhere to the face of barrier **36** adjacent zone A will be effectively reduced in size and their fibres separated by reason of the action of the fluid material being discharged, under pressure, through nozzles **52** whereby the mixture within zone B will be free of chunks of lumps of compacted fibrous material larger than the openings through the perforate barrier **36**. As the contents of zone B enter inlet **72** of the pump, they are subjected to the violent action of flails **94** which will further effectively separate and disintegrate any large chunks or lumps before they can pass to the impeller **100** and thence into the interior of the pump.

The comb strainer **76**, as best illustrated in FIG. 7, includes an inlet **110** and an outlet **112** of a housing **114** which contains a series of perforate plates **116** arranged in a zig-zag fashion for further effecting separation and disintegration of compacted fibrous material discharged from outlet **74** of the pump. In the preferred embodiment of the invention, access to the interior of the comb strainer may be readily effected by means of a place **220** which is securely though detachably fastened to one face of the housing such as, by way of example, by means of bolts **224** engaging internally threaded apertures **126** in the housing.

The device is permitted to operate in the so-called charging cycle schematically illustrated in FIG. 2 until the characteristics of the slurry are such as to permit its being sprayed through nozzle **92**, at which time valve **78** is manipulated for delivering the discharge of the pump directly to the nozzle as per the discharge cycle schematically illustrated in FIG. 3.

After the contents of the chamber **20** have been depleted via the nozzle, the pump and impeller drive is stopped, whereupon the chamber is charged with water and compacted fibrous material for repeating the charging cycle.

In order to provide quick access to the intake of the pump for purposes of inspection, cleaning and the like, I have provided an opening **120** in the outer surface of intake elbow **122**. A cover plate **124** is adapted to be securely though releasably anchored relative to elbow **122** for closing opening **120** as best illustrated in FIGS. 4 and 5. Solely by way of example, it will be noted that the ends **129** and **131** of a latch bar **130** are adapted to be inserted under the bridge **132** of a pair of U-shaped brackets rigidly secured to and carried by opposite ends of opening **120**. Screw elements **136**, which extend through and threadably engage threaded portions of latch bar **130**, are adapted to exert a force on cover plate **124** for effecting a water-tight seal of plate **124** with the peripheral edges of opening **120**, it being understood that a suitable gasket, not illustrated, will be interposed between the adjacent faces of the cover plate and elbow.

The pattern of the sprayable mulch as discharged through nozzle **92** may be altered by using the nozzle constructions illustrated in FIGS. 11 and 12, which latter nozzles include rotary elements **330**, the purpose of which is to effectively break up and spread the stream of sprayable mulch incident to its discharge from the end of nozzle **332**. It has likewise been established that the fibres contained in the sprayable mulch being discharged through nozzle **332** are further separated and additionally disintegrated by reason of the action of rotatable elements **330**.

In the preferred embodiment of the invention the impellers on shaft **38** of FIG. 1 are disposed in such a manner as to impart a circulatory radial action in zone H around shaft **38**, to impart a circulatory axial action in zone I toward rear wall **28**, and to impart a circulatory axial action in zone B toward front wall **26**. The subject invention is neither concerned with nor directed to the particular structural details of the various impeller assemblies denoted generally in FIG. 1 by the letters C, D, E, F and G, however since the major part of the mixing occurs in zone A, that zone is provided with a greater number of agitators than zone B.

With particular reference now to FIG. 4, it may be noted that uniformly excellent results have been obtained in those instances wherein the flails **94** are inclined in the neighborhood of 30° from vertical toward impeller **100**, and wherein the overall length of the flails are such as to substantially span the intake port of the pump.

It should be understood that seed and fertilizer may be added via hatch **34** to provide a sprayable mulch which when sprayed onto the ground, bank or the like will provide a uniform ground cover which will effectively preclude washing or erosion of the soil beneath the cover while providing protection and nutrient for the seeds contained therein.

If desired, asphalt may be added to the mulch to control weed or other growth.

Still another use to which the pumpable slurry may be put is in grouting wherein the fibre-laden slurry is pumped into the ground to stop water leaks prior to the introduction of concrete.

It should, of course, be understood that the chamber or tank **20**, pump **70** and a suitable prime mover for the pump and agitator shaft **38** may be mounted upon a suitable chassis, not illustrated, whereby the entire device is completely mobile.

In addition to the foregoing, the subject apparatus and method are ideally adapted for providing aqueous, sprayable suspensions of agricultural materials to produce and/or encourage growth such as, by way of example, grass seed, fertilizer, lime, top soil and other soil conditioning materials and mixtures thereof. The heavier of such agricultural materials such as lime, top soil, fertilizer, and the like will be continuously mixed, agitated and circulated whereby to keep said materials in uniform suspension, in which condition they may be readily

pumped from container 20 for discharge through nozzle 92.

Even light material such as seed, which would normally float, will be effectively mixed, agitated and circulated whereby the seed will likewise be maintained in a uniform, pumpable, sprayable suspension.

It should, of course, be understood that the subject apparatus and method contemplates the preparation of a pumpable and sprayable aqueous solution having a high solids content of the aforementioned agricultural materials either with or without the addition of the fibres of wood pulp.

What is claimed is:

1. The method of preparing a sprayable mulch slurry comprising the steps of placing a quantity of partially dried compacted wood pulp and a quantity of water in a chamber, agitating the said compacted wood pulp and the water in said chamber so as to loosen and separate the fibers of said compact wood pulp to form a slurry, then passing the slurry into another chamber and continuously agitating said slurry in said other chamber and simultaneously and continuously recirculating said slurry through a circuit connected between said chambers until the compacted wood pulp has been substantially disintegrated into separate fibers and said fibers are thoroughly mixed in suspension with said water thereby providing an available sprayable supply of slurry of uniform consistency in said circuit.

2. The method defined in claim 1, wherein said method includes the step of further agitating said slurry while it is circulated through said circuit.

3. The method defined in claim 2, including the step of simultaneously straining said slurry in passing between said chambers while agitating and recirculating it so as to prevent compacted lumps of said wood pulp from passing through said circuit.

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