Aug. 29, 1967 P. NOBILI 3,338,251

FOODSTUFF WASHING MACHINE.

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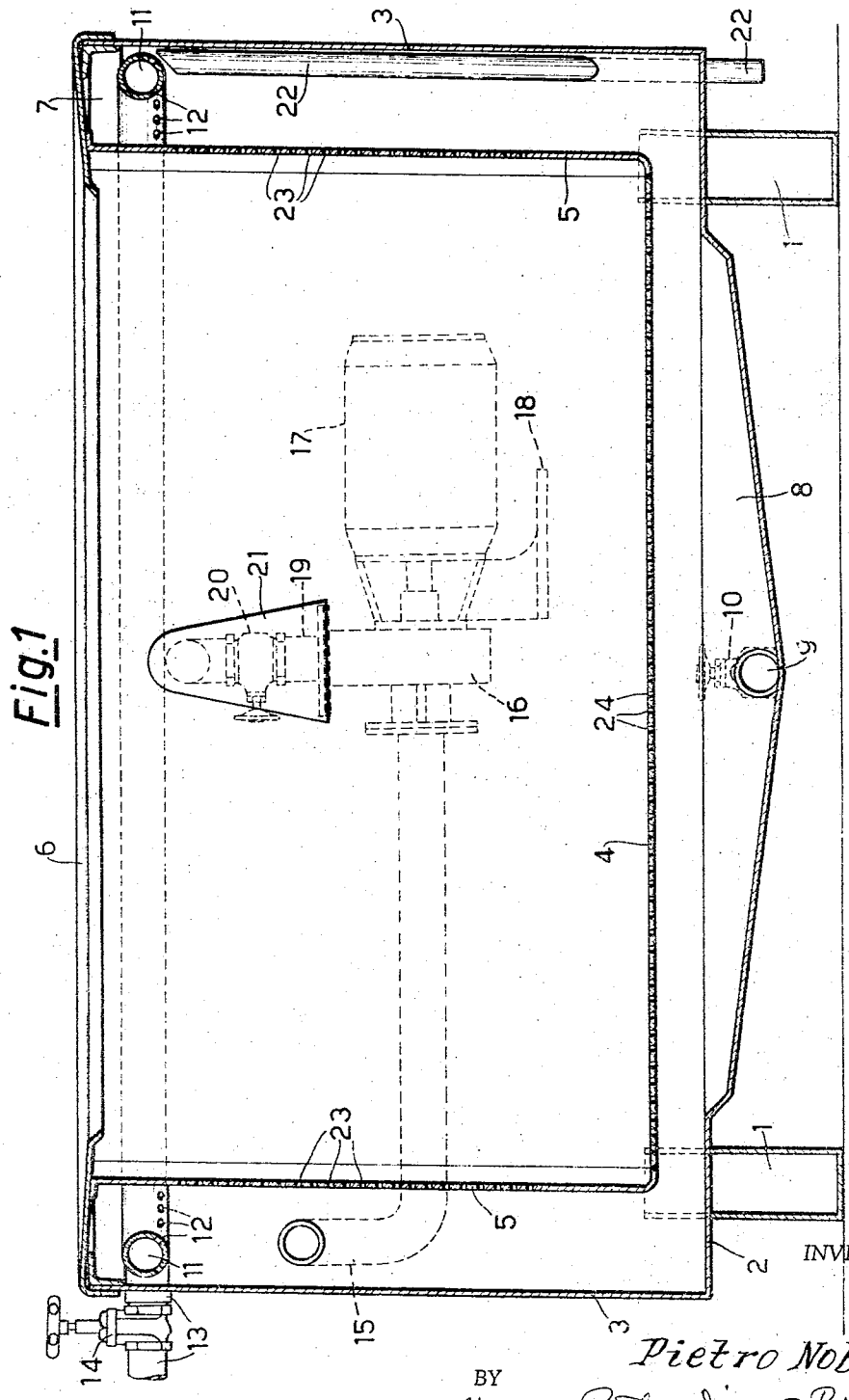

Fig.1

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Fig.2

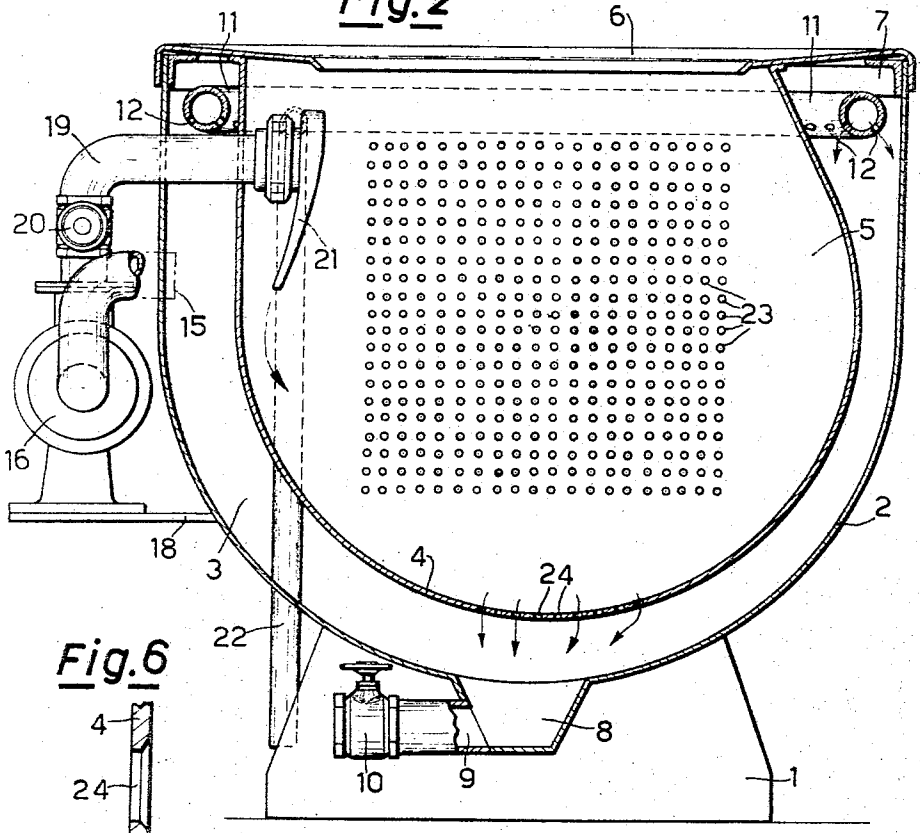

Fig.6

Fig.3

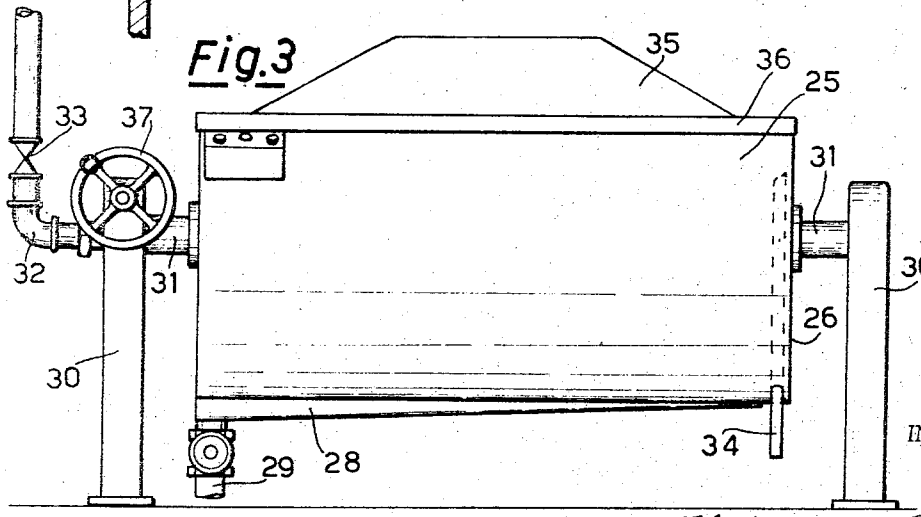

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Fig.4

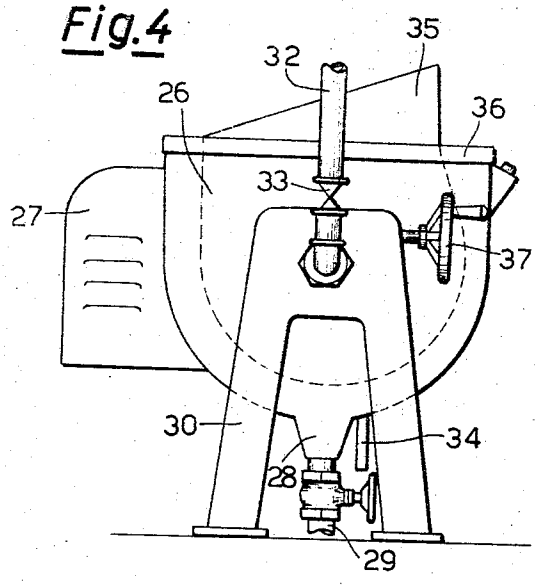
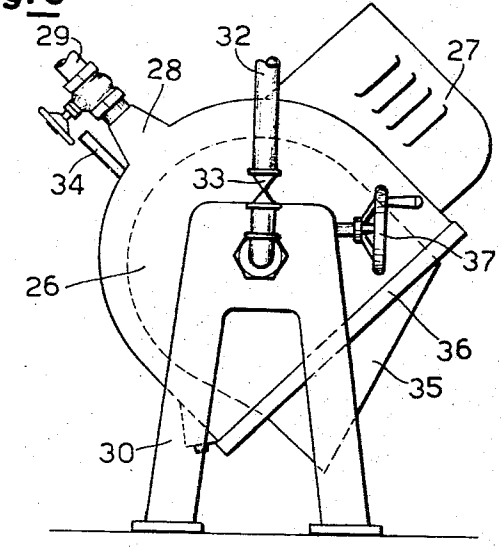


Fig.5



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FOODSTUFF WASHING MACHINE

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740,765
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This invention relates to a machine for washing foodstuffs, more particularly vegetables and herbage, which however can find a profitable employment also for washing meat, fish and fruits.

An object of the present invention is that of providing a machine adapted to carry out the washing as aforesaid and to afford performances such as to render it particularly suitable for a commercial use and for communities such as hospital or industrial concern canteens.

Another object is to provide a machine capable of assuring a perfect washing carried out with rapidity.

Still another object is to provide a machine which can be easily and economically constructed while requiring the least possible employment of manpower the whole washing cycle throughout.

The foregoing and other objects are achieved by the inventive machine, which comprises two tubs, one mounted within the other, so as to form a gap therebetween, a plurality of nozzles located within said gap and connected to a source of pressurized liquid, and a drain pipe connected to said gap, the outer tub being supported by a baseplate and the inner tub being confined by a peripheral wall having a virtually cylindrical outline and two foraminous header walls, other perforations being formed through said peripheral wall of said inner tub so as to embrace an area extending substantially in the neighbourhood of the lowermost generating line of said inner tub and along said generating line, at least one nozzle, also connected to a source of pressurized liquid, being placed within the inner wall in the neighbourhood of the peripheral wall thereof on a side of said lowermost generating line, said peripheral wall sloping inwardly with respect to said tub on the other side of said generating line.

According to a particularly advantageous embodiment, said plurality of nozzles is formed by at least a foraminous pipe section extending within said gap and connected via a feeding duct to said source of pressurized liquid.

Still more advantageously said nozzle located within the inner tub is connected to the delivery side of a pump whose intake side opens into the gap between said outer and said inner tubs: this particular expedient is such as to afford remarkable savings as to the wastage of water necessary for effecting said washing operation.

In order that a clear understanding of the machine structure be arrived at along with an appreciation of the advantages afforded thereby, two embodiments of said machine will be described in the following, by way of example only and without implying any limitation whatsoever, reference being had to the accompanying drawings, wherein:

FIGURE 1 is illustrative of a lengthwise cross-sectional view of a machine taken along line I—I of FIGURE 2.

FIGURE 2 is illustrative of a cross-sectional view of the same machine, taken along line II—II of FIGURE 1.

FIGURE 3 shows in a diagrammatical way and in front view an embodiment of said machine in which the machine can rotate about a horizontal axis, and

FIGURES 4 and 5 are illustrative of the machine of FIG. 3 as viewed sidewise, in an erected position and in a position rotated about said horizontal axis, respectively, while.

FIGURE 6 is illustrative of a close-up, in cross-section, of one of the perforations formed through the header walls and the peripheral wall of the inner tub of the machine.

The machine as shown in FIGS. 1 and 2 is comprised of two tubs, the outermost one borne by a baseplate **1**, confined by a peripheral wall **2**, having a cylindrical outline and a cross-sectional shape in the form of a U with the open side facing upwardly, and by two header walls **3**, the other tub, internal with respect to the one already described and forming therewith a gap, confined by a peripheral wall **4** having a cylindrical outline, broken away in its top portion so as to provide an opening which extends along the whole length of the tub throughout and by two header walls **5**. The peripheral wall **4** on the right of the machine as viewed in FIG. 2 is sloping with continuity towards the internal portion of the machine, whereas on the left side the peripheral wall **4** is vertical and its bottom has a substantially circular outline.

Upon the edges of the opening of the inner tub a metal sheet member **6** is spot welded, which has a closed ring outline of a shape akin to the shape of a cross-section taken in the tub with a horizontal plane, the shape of rectangular ring in the case shown herein. Said member **6** has a wing which protrudes towards the outside of the tub whereto it is welded, said wing resting on the free edge of the outer tub, with respect to which it is held in a fixed position by the end edge of said wing which is curled downwardly so as to encompass the walls of the outer tub. An angle iron **7** is welded internally of the outer tub, along the free edge thereof, so as to provide an extended resting surface to the jutting wing of member **6** which latter, in the mode described above, firmly holds the inner tub suspended within the outer one.

In correspondence with the lowermost region of the peripheral wall **2** of the outer tub, a well **8** is formed, which is confined by surfaces sloping towards a point to which an outlet pipe section **9** is connected, which is fitted with a handwheel controlled cutoff valve **10**.

In the uppermost region of the inter-tub gap, immediately below member **6**, there is a pipe section **11** which is a rectangular closed loop encompassing the inner tub. Said pipe **11** is foraminous as in **12** and is connected, via a feed duct **13** (this latter having a handwheel controlled cutoff valve **14**) to a source of pressurized liquid, such as, e.g., to the conventional water main.

In the inter-tub gap opens also the intake side **15** of a centrifugal pump **16** driven by a motor **17** and carried therewith by a supporting plate **18** jutting from the peripheral wall of the outer tub and solidly affixed thereto. The delivery side **19** of the pump, through which a handwheel controlled cutoff valve **20** is serially arranged, passes through both the peripheral walls of the outer and the inner tubs and, at its free end, carries a nozzle **21** located in the inner tub, close to the vertical portion of the peripheral wall **4** thereof, towards which it is slightly sloping as more particularly viewed in FIG. 2. The pump **16**, when it is actuated and the tubs are filled with liquid, delivers pressurized liquid to the nozzle **21**, said liquid being drawn by said pump from the inter-tub gap as will become clearer herein-after.

FIGURES 1 and 2 are also illustrative of an overflow member merely consisting of a vertical pipe shank **22** passed through the outer tub and having its upper end cut so as to form a spillway and located in the intertub gap at a level lower than that of pipe **11** and higher than that at which opens the intake end **15** of the pump.

It should also be noted that in both the header walls **5** of the inner tub perforations **23** are formed which establish a communication between the inner tub and the intertub gap. With advantage, said perforations are formed

along parallel rows and spread over an area having, for example, a square outline with, still exemplarily, 21 perforations for each side, i.e. a total of 441 perforations. Other orifices **24** are formed through the peripheral wall of the inner tub so as to embrace an area extending the whole length of the tub throughout around the lowermost generating line of the inner tub. Also said orifices are formed, with advantage, along parallel rows and with a higher number of orifices with respect to the lowermost generating line of the tub as viewed in the drawings, on the side in which the wall **4** slopes towards the inside of the tub as can be more particularly seen FIG. 2. These orifices, for example, could be 590 in number, arranged along ten rows of 59 orifices each. The results of field tests has shown that orifices with a virtually frustoconical shape are particularly efficient, such as those exemplarily shown FIG. 6, with the broader end of the orifice facing the inside of the inner tub.

In order that the operation of the machine shown herein may appear fully conspicuous, let us assume that it is desired to carry out the washing of a herbage lot, spinach for example.

Cut off valve **14** is opened and thus water is fed under pressure from the water main, via the feed duct **13** and the foraminous pipe **11** into the intertub gap and therefrom, via the orifices **23** and **24**, into the inner tub. Should the cutoff valve **10**, inserted in the outlet pipe **9** be closed, water rises in the intertub gap and in the inner tub. As water has risen just to reach a level slightly below (e.g. 5 cms. below) the spillway edge **22**, valve **14** is closed and spinach is unloaded in the inner tub through an upwardly facing opening confined by the inner edge of the ring member **6**. The motor **17** is switched on to actuate the pump **16**, and this latter draws water from the intertub gap and forcibly thrusts it through the nozzle **21** into the inner tub, thus giving rise to a closed loop circulation of the washing water. The shape of the peripheral wall **4** of the inner tub and the shape and arrangement of the nozzle **21** as particularly shown FIG. 2 are such as to impart a whirling motion to the water delivered by the nozzle. Said whirling motion of water induces an appreciable stirring of spinach within the machine along with a concurrent ejection of debris, e.g. mould unloosened from spinach, through the orifices **23** and **24**.

The result is that, while spinach is being washed and the debris unloosened therefrom, spinach is prevented from getting in contact with said debris in any wise, the waste being forwarded towards the intertub gap and therefrom collected into the well **8**. Washing with the actuation of the pump **16** is protracted for a length of time which is a function of the nature of the vegetable, more or less tender as it may be, which is being washed, and of the degree of contamination thereof. When it is deemed that the washing time is sufficient the motor **17** is switched off, valve **10** is opened and, via the piping **9** the water held by the inner tub and the intertub gap is dumped along with the dirt collected in the well **8**.

Valve **14** is then opened again and pressurized water is sprayed through the orifices **12** of the pipe **13** into the intertub gap, the latter being thus accurately cleaned while water is dumped via pipe **9**. It should be noted that the pressure of water in the pipe **11** must suffice to permit that said water be evenly distributed in said pipe and might be ejected under pressure from the orifices **12**, so as to assure an expeditious clearance of the intertub gap to have the dirt adhering to the intertub gap wall rapidly discharged. This step completed, valve **10** is closed again and the machine is filled with water anew.

Valve **14** is also closed again and pump **16** is switched on once more: it provides by the water jet ejected from nozzle **21** to rinse spinach, said step taking a few minutes, two or three minutes being the average time.

On completion of the rinsing step, the motor which drives the pump **16** is switched off over again, the cleaned spinach being removed from the inner tub. By opening valve **10** and taking over a new washing of the intertub gap and closing valve **10** over again, the machine is enabled another time to be used for a further washing cycle.

It should be observed that, while in the machine as described above the use of a single nozzle **21** has been indicated, in the case of machines having exceedingly long tube the necessity arises of providing a plurality of nozzles such as **21** and similarly arranged close to the vertical portion of the wall **4** of the inner tub, said plurality of nozzles being fed, for instance, by a single manifold mounted alongside the inner tube and connected, in turn, to the duct **19**. The closed loop washing step as described above, wherein the pump **16** provides to recycle water and the valves **10** and **14** are closed, is particularly advantageous on the basis of economical considerations, it having been ascertained that it ensures a quick and efficient washing. However, in places where no water shortage problem is extant, or washing economy, washing can be carried out while keeping both valves **10** and **14** opened with the pump still running. Likewise, washing could be performed by directly feeding the nozzle **21** with water drawn from the water main, providing that the latter has a sufficient pressure, and keeping valve **10** opened without, obviously, resorting to the pump **16**.

In the case of tender vegetables such as spinach referred to above, it is expedient to keep the valve **20**, inserted in the delivery section **19** of the pump **16**, in the closed position.

When, conversely, the washing of meat, fish or tougher vegetables and herbage is in the question, such as for example carrots, turnips, onions, valve **20** which adjusts the waterflow to the nozzle **21** should be kept almost fully opened.

To give an example; in no wise a limiting one, it can be said that a machine of the kind described in the foregoing and having an inner tub of about 1 cubic meter capacity is capable of perfectly washing from 600 to 800 kgs. of vegetables an hour, consistently, as aforesaid, with the more or less tender texture, or the more or less important dirtload of the vegetable under consideration.

A last factor which should be kept into account is that the several cutoff valves described above could be controlled, rather than manually with their respective handwheels, in any other way known in the art, e.g. by electrically actuated remote controls.

Having now reference to FIGURES 3, 4 and 5, it can be seen that a machine has been shown therein, which is similar as to its structure to the one shown FIGS. 1 and 2, and thus it has been only diagrammatically illustrated. In this machine, the numeral **25** connotes the peripheral wall and **26** the header walls of the outer tub of the machine. The inner portion of this machine is wholly similar to that already described herein, that is to say, it comprises an inner tub having foraminous walls, at least a nozzle therewithin, fed by a pump which, along with its driving motor, is supported by a bracket affixed to the peripheral wall of the outer tub and is protected by a covering hood **27**. Below the peripheral wall **25** of the outer tub, a well **28** is provided with an overflow tube **29** which can be closed by a cutoff valve. The numeral **30** connotes the machine baseplate formed by two sidewalls placed in front of the header walls **26** wherefrom two pins **31** project which are affixed to said walls substantially at the midpoint of the tub, said pins being borne by roller or ball bearings on the bedplate sidewalls. The left pin **31** of the machine, as viewed on FIG. 3, is hollow and within it a duct **32** is passed. Said duct has a cutoff valve **33** and connects the water main with a foraminous pipe located in the intertub gap of the machine, wholly similarly to what has been described in connection with FIGS. 1 and 2.

Finally, the numeral **34** indicates an overflow tube and **35** the funnel-like flared innermost edge of a member **36** having a closed loop configuration and fixedly carrying the inner tub over the outer one. Handwheel **37**, borne

by the baseplate, is solid with an endlessly-screw-threaded shaft which engages a worm-wheel keyed to the pin **31** of the machine.

By keeping the machine in the position shown FIGS. 3 and 4 a load of vegetables is introduced and washed in a manner wholly similar to that described above. Once the rinsing step is over, the valve **33** is closed while simultaneously opening the valve inserted in the pipe **29** so as completely to discharge water from the tub. By rotating the handweel **37** the tubs are caused to rotate about the pins **31**. As said tubs are rotated towards the position shown FIG. 5, the washed vegetables are automatically unloaded from the inner tub into baskets or on conveyor belts, thus cutting the time necessary for completing a washing cycle.

No attendance is necessary during progress of the washing operations.

I claim:

1. A machine for washing foodstuffs, more particularly vegetables, consisting of two tubs, one mounted within the other one to form a gap between their respective walls, a plurality of nozzles positioned in said gap and connected to a source of pressurized liquid, and an overflow tube connected to said gap, the outer tub being supported by a baseplate and the inner tub being confined by a peripheral wall having a substantially cylindrical outline and by two header walls in which perforations are formed, other perforations being formed in said peripheral wall of said inner tub to cover an area which extends substantially in the neighborhood of the lowermost generating line of said inner tub and along said generating line, at least one nozzle also connected to a source of pressurized liquid being positioned within the inner tub in the neighbourhood of the peripheral wall on a side of said lowermost generating line, said peripheral wall, on the other side of said generating line, sloping towards the inside of said tub.

2. A machine according to claim **1**, wherein said plurality of nozzles consists of at least a foraminous pipe section extending within said gap and connected via a feed duct to said source of pressurized liquid.

3. A machine according to claim **2**, wherein said feed duct is equipped with a cutoff valve.

4. A machine according to claim **1**, wherein said inner tub has on its top region a loading and unloading port extending the whole length of said tub throughout.

5. A machine according to claim **4**, wherein to the edges of said loading and unloading port of the inner tub is rigidly affixed a metal sheet member having an annular configuration whose outline is similar to that of the form, in plan view, of said tubs, said sheet metal member having a wing projecting towards the outside, said wing resting upon said outer tub so as to support the inner tub in spaced apart relationship with respect to said outer tub so as to form a gap therebetween.

6. A machine according to claim **1**, wherein said outer tub is confined by a peripheral wall having a substantially cylindrical outline and by two header walls, said peripheral wall having a substantially U-shaped cross-sectional shape with the open side directed upwardly.

7. A machine according to claim **1**, wherein said nozzle positioned in the inner tub is connected to the delivery side of a pump whose intake side opens into the gap between said outer tub and said inner tub.

8. A machine according to claim **7**, wherein a cutoff valve is inserted in the delivery duct of said pump.

9. A machine according to claim **1**, comprising an overflow member whose overflow discharge end is positioned in the gap between said outer tub and said inner tub.

10. A machine according to claim **1**, wherein said discharge tube is connected to a well formed in correspondence with the lowermost portion of the peripheral wall of the outer tub, a cutoff valve being inserted in said discharge tube.

11. A machine according to claim **1** wherein said orifices formed through the header walls and the peripheral wall of said inner tub have a substantially frustoconical outline, the cross-section having the largest area being directed towards the inside of the inner tub.

12. A machine according to claim **11**, wherein said orifices formed through each header wall and said peripheral wall, respectively, of the inner tub are arranged along parallel rows.

13. A machine according to claim **1**, wherein said inner tub is supported by said outer tub so as to form a gap therebetween.

14. A machine according to claim **1**, wherein the area containing the orifices formed through said peripheral wall of said inner tub and extending in the neighbourhood of the lowermost generating line of said inner tub and along said generating line, has, with respect to said generating line an extension which is larger on the side in which the peripheral wall of the inner tub is inclined towards the inside of said tub than is on the side on which said nozzle is positioned.

15. A machine according to claim **1**, wherein said two tubs are solidly affixed to one another and rotatably supported on a baseplate so as to rotate about a horizontal axis.

16. A machine according to claim **1**, wherein said outer tub carries two coaxial pins positioned substantially in the midpoint of the inner tub and confronting the header walls thereof, said pins being borne in a freely rotatable way by said baseplate of said machine.

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