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(72) Inventeurs/Inventors:
SVENTITSKIJ, EVGENIJ NIKOLAEVICH, RU;
GLUSHCHENKO, VALERIJ MIHAILOVICH, RU;
TOLPAROV, YURIJ NIKOLAEVICH, RU

(73) Propriétaire/Owner:
BATTELLE MEMORIAL INSTITUTE, US

(74) Agent: GOWLING WLG (CANADA) LLP

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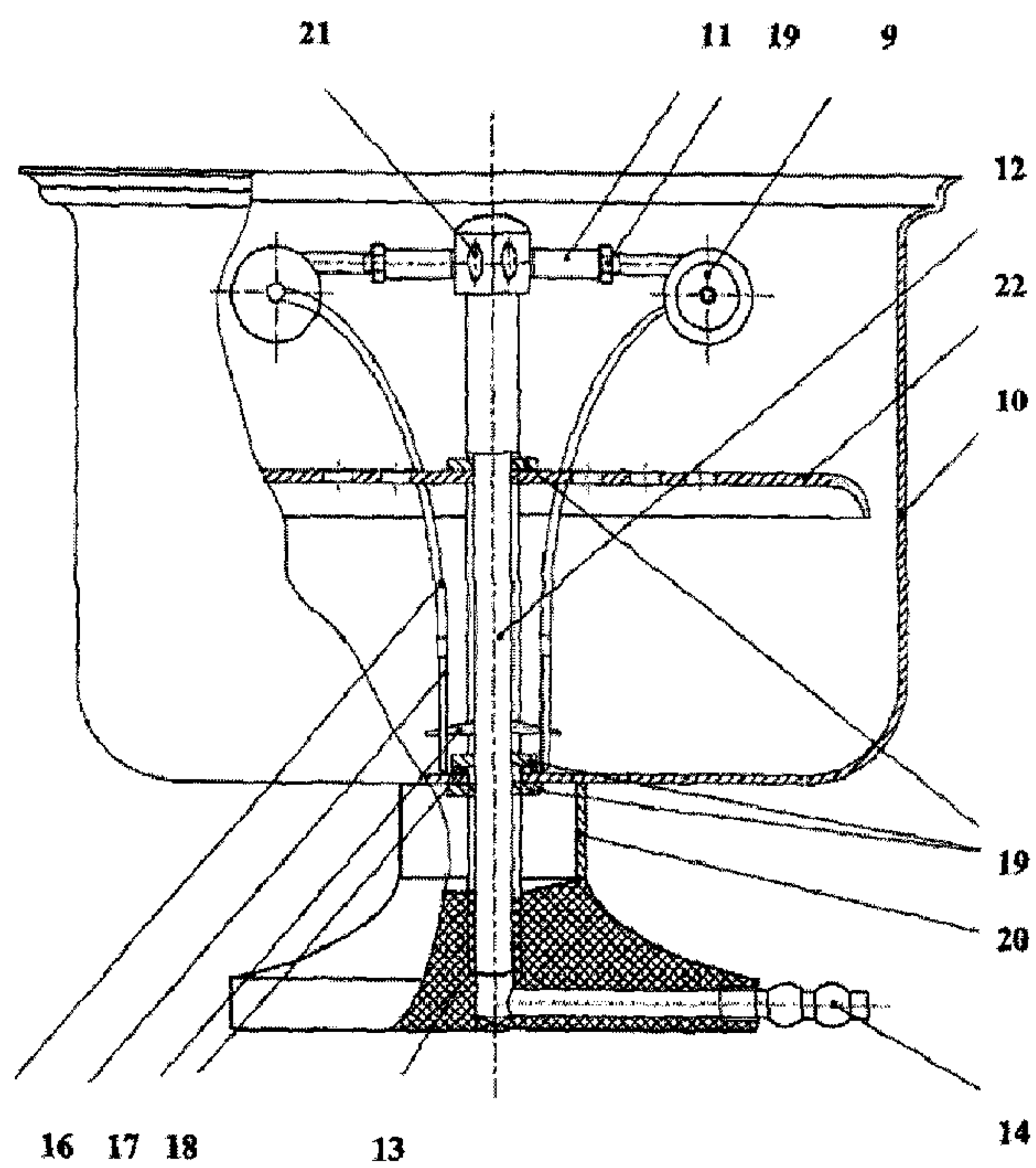

(57) Abrégé/Abstract:
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The proposed device is intended for aerosolization of labile liquids, it includes 1 or several ejector atomizers arranged with

(57) Abrégé(suite)/Abstract(continued):
possibility of their rotation with respect to a horizontal plane. The atomizer contains the chamber with the nozzle, in which the branch pipes for supplying of liquid material to be atomized and air are introduced, at that the air supply branch pipes are tangentially arranged in the chamber, and the sizes of the branch pipes openings and of the nozzle are related by the equation Do=(0,5÷0,7) D^2c/Dk, wherein Do is the diameter of liquid supply branch pipe, Dc is the diameter of the outlet nozzle, Dk is the diameter of the air inlet channel, and the atomizers themselves are arranged in the cylindrical container above the liquid surface in such a way that the jet coming out therefrom is chordwisely oriented with respect to the walls of the cylindrical container, at that the projection of the central axis of the aerosol spray on the cylinder walls doesn't cross the top edge of the walls during at least one turn at motion of the aerosol particles.
The results of the conducted tests showed, that the declared device allows to obtain stable fine aerosol of liquids with properties varying in the wide range.

ABSTRACT OF THE INVENTION

AEROSOL DEVICE

The invention relates to the devices intended for atomization of liquids with the purpose of obtaining fine aerosol.

The proposed device is intended for aerosolization of labile liquids, it includes 1 or several ejector atomizers arranged with possibility of their rotation with respect to a horizontal plane. The atomizer contains the chamber with the nozzle, in which the branch pipes for supplying of liquid material to be atomized and air are introduced, at that the air supply branch pipes are tangentially arranged in the chamber, and the sizes of the branch pipes openings and of the nozzle are related by the equation $Do=(0,5\div0,7)\ Dc^2/Dk$, wherein Do is the diameter of liquid supply branch pipe, Dc is the diameter of the outlet nozzle, Dk is the diameter of the air inlet channel, and the atomizers themselves are arranged in the cylindrical container above the liquid surface in such a way that the jet coming out therefrom is chordwisely oriented with respect to the walls of the cylindrical container, at that the projection of the central axis of the aerosol spray on the cylinder walls doesn't cross the top edge of the walls during at least one turn at motion of the aerosol particles.

The results of the conducted tests showed, that the declared device allows to obtain stable fine aerosol of liquids with properties varying in the wide range.

AEROSOL DEVICE

Field of the Invention

The invention relates to the field of technique, and namely to the devices intended for liquids atomization with the purpose of obtaining fine aerosol.

Background of the Invention

Nowadays for obtaining fine aerosols different devices are used, functioning both using compressed air and on the base of other principles of the liquid drops breakup.

The atomizers, consisting of the pipeline connected to the source of liquid supply with the atomizer nozzles arranged along the pipeline, are known. These atomizers ensure possibility of large areas treatment (the bar length of a regular sprayers is about 1-6 meters). (Jesuya.Spraying of crude and residual oil products. Energy machines. 1979, v.101, No.2, p.44-51; Kim K.V., Marshall W.R. Drope-size distributions from pneumatic atomizers. A.I.Ch.Journal, 1971, v.17, No.3, p.575-584). However, as a result of poor quality of spraying (the drops diameter of the hydraulic atomizers lays within the limits 200-500 mcm) and possibility of blockage of the atomizer nozzle in the process of atomization of blend compositions, their application is enough restricted.

Better results are achieved using the internal mixing atomizer, consisting of the pipeline with the branch pipes for liquid and compressed air supply and the outlet channels arranged on its wall (SU 1248671, 1984).

The disadvantage of this atomizer is low efficiency factor of the dispersion process, that is caused by increase of friction losses during motion of liquid and air in the curvilinear pipeline, as well as instability of the air-liquid mixture flow.

The pneumatic atomizers applied for obtaining of aerosol are known, consisting of straight-jet nozzle connected to the source of gas supply and the branch pipe of liquid supply, coaxially installed (Kim K.V., Marshall W.R. Drope-size distributi-ons from pneumatic atomizers. A.I.Ch. Journal, 1971, v.17, No.3, p.575-584). These atomizers are characterized by high productivity, but they create the narrow and very long spray, that embarrasses uniform distribution of aerosol in the treated space. During liquids atomization exists possibility of the nozzle blockage with casual admixtures because of its small flow area.

The aerosol device is known, consisting of the assembly of atomizing agent (compressed air) supply, atomizing assembly on the base of ejector and the hermetic container with the atomized solution, where the pipe, connecting it with the atomizing assembly, is arranged (RU 2060840, 1992). The disadvantage of the device is its relatively low productivity with fine aerosols.

The device for disinfection of water-pipe constructions is known (RU 2258116, 2004), in which as the aerosol generator the spray nozzle is suggested to use. Using the spray nozzle it's possible to obtain only large-dispersed aerosol with the particles size 70-80 mcm.

The disadvantage of this device is impossibility of obtaining in these conditions stable fine aerosol, which would ensure reliable treatment of the surfaces .

The centrifugal aerosol generators are known (RU 2148414,1998; RU 2258116, 2004), in which dispersion is executed during liquid supply at the disk of generator, rotating with the speed no less than 20000 rot/min. Atomization with the help of the disk atomizer (RU 2180273, 2000) is usually executed without mixing of aerosol with air. The advantage of these devices is possibility of minimizing the negative influence of air at formation of active aerosol. However, for formation of the drops with size less than 10 mcm, the thickness of pellicle, spilling on the rotating surface, must be several mcm. The device is applied in dispersion of water solutions for formation of aerosol with the particles size about 100 mcm (V.F.Dumsky, N.V.Nikitin, M.S.Sokolov. Pesticide aerosols. - M. Nauka (*Science*), 1982. – 287p.).

The disadvantage of such devices is relatively poor productivity, being several ml per minute, mechanical unreliability, as well as inapplicability for atomization of liquids with high viscosity, and also heterogeneous mixtures.

For aerosols obtaining the atomizers are also used, in which liquids dispersion is executed with the help of ultrasound (V.F.Dumsky, N.V.Nikitin, M.S.Sokolov. Pesticide aerosols. - M. Nauka (*Science*), 1982. – 287p.). The advantage of such devices is sufficiently productive generation of fine aerosol with the drops size about several mcm. The disadvantage of this technology is impossibility of its use for dispersion of nonaqueous liquids, the solutions with increased viscosity, and also the heterogeneous mixtures (K. Nikander. Drug delivery systems. J. Aerosol. Med.,1994; 7 (Suppl.1):519-524).

Essence of the Invention

The technical task, solved in the context of the declared technical solution, was creation of the universal device for aerosolization working with use of practically all the liquids, including solutions, suspensions and emulsions, and allowing to create concentrated fine aerosols, having in their contents the aerosol particles with size 1 mcm and less, retaining qualities of atomized solution during relatively long time period.

Solution of said task is achieved in the result of creation of the device for obtaining fine aerosol, in which dispersion is executed in two stages, at first of which the drops of the atomized substance are mixed with turbulent air jet and are exposed to prior dehumidification, and at the second stage an additional dehydration and separation of the drops take place, and as a result aerosol enriches with fraction with the particles size about 1 mcm and less.

The technical result is achieved by the fact that no less than one ejector atomizer is used, containing the internal mixing chamber in which a substance to be atomized and, tangentially with respect to the walls of the internal chamber – air are supplied, at that the ratio of the values of the cross-sections of the branch pipes of coming air, liquid and the outlet opening of the ejector nozzle is selected in such a way that it would be $Do=(0,5\div0,7)\ Dc^2/Dk$, wherein Do is the diameter of the liquid supply branch pipe, Dc is the diameter of the outlet nozzle, Dk is the diameter of the inlet channel of coming air, and the ejector atomizers themselves are arranged in the cylindrical container in such a way, that the jet coming out therefrom would chordwisely oriented with respect to the walls of the cylindrical container, at that the projection of the central axis of the aerosol spray on the walls of the cylinder doesn't cross the top edge of the walls during at least one turn, that ensures the aerosol particles rotation in the container no less than one turn.

In a result of using these conditions, at the first stage it's possible to ensure the tangential vortical motion in the atomizer chamber, that leads to uniform distribution of the aerosol particles broken by the vortical flows, leak-in of drier external air into the central part of the chamber, partial dehydration and reduction of the aerosol particles size at the process of contact of liquid drops and dry air.

During coming out of the jet from the ejector nozzle further dehydration of the aerosol drops takes place. The structure of the atomizer allows to obtain already at the nozzle outlet aerosol with the average particles size 8-10 mcm. During stay in the generator container the drops are exposed to further dehydration and reduction of their sizes as a result of mass exchange with air. Simultaneously, because of chordwise orientation of the nozzle spray with respect to the wall of the generator container, the biggest aerosol drops during the circular motion inside the container fall on the wall of the container and flow down along it, ensuring additional rise of fine fraction contents at aerosol output from the generator.

The angle of inclination of the ejectors and accordingly the time of stay of the aerosol drops in the container is usually selected in order to ensure no less than one turn of circular motion of the particles inside the container. At that an additional reduction of the particles size up to 3-5 mcm takes place.

The angle of inclination of the ejector atomizer is experimentally selected reasoning from the tasks to be solved with the help of the device. Increase of the time of stay of aerosol in the container reduced the device efficiency, simultaneously reducing the aerosol drops size, and on the contrary, the reduction of the time of stay of aerosol in the container increases the device efficiency, simultaneously making aerosol more large-dispersed. The device contains from 1 to several ejectors arranged above the liquid surface with possibility of their rotation with respect to a horizontal plane.

Inside the container for better separation of the large-dispersed aerosol particles the reflector carried out in the form of a horizontal plate may be arranged. The container is usually made open, however, if necessary, for example, for aerosol transportation, it may be additionally provided with the diffuser with the branch pipe.

Brief Description of the Drawing Figures

The general scheme of the aerosol device is presented at the Fig.1; the base scheme of the aerosol generator is presented at the Fig.2; the scheme of the ejector atomizer – at the Fig.3; the scheme of the aerosol generator in variant with the cover – at the Fig.4.

At the drawings the following designations are used:

1- the vortical aerosol generator (VAG)
2- the container with dispersed material
3- the liquid flowmeter
4- the compressor with the motor
5- the pressure reducer
6- the manometer
7- the filter
8- the chamber with treated material
9- the vortical ejector atomizer
10- the container body
11- the lead-out
12- the distributor
13- the support

14- the fitting for supply of atomizing agent
15- the connecting pipes
16- the fitting for intake of product to be atomized
17- the fixing ring
18- the lining
19- the nut
20- the insertion
21- the plug
22- the reflector
23- the atomizer chamber
24- the tangential channels of compressed gas supply
25- the outlet nozzle of the atomizer
26- the branch pipe of liquid supply
27- the cover
28- the outlet branch pipe
29- the butterfly-nut
30- the lining

The Best Variant of Realization

The aerosol device (Fig.1) consists of the aerosol generator 1, and connected with it: the line of atomized agent supply, consisting of the container 2 with material to be atomized, provided with the liquid flowmeter 3, and the atomizing agent provision line, including connected in sequence the compressor 4 with the motor, the pressure reducer 5 with the manometer 6 and the filter 7. The device may additionally include the chamber for placement of treated material 8, connected with the pipeline for aerosol transportation from the generator 1.

The aerosol generator 1 (Fig.2) consists of the vortical ejector atomizers 9, arranged inside the cylindrical body of the container 10 in such a way, that the aerosol jet (spray) in the container is oriented onto its walls chordwisely. The number of the atomizers 9 depends on peculiarities of the current task. If necessary, a part of the atomizers 9 is disassembled, the plugs 21 are installed instead of them.

For ensuring possibility of work in different modes the ejector atomizers are arranged with possibility of their rotation with respect to a horizontal plane, leading to change of orientation of the atomized liquid spray. At that for obtaining of liquid dispersion with minimum particles size the atomizers are usually arranged in such a way, that the projection of the central axis of the aerosol spray onto the cylinder walls doesn't cross the top edge of the walls during at least one turn, that ensures the circular motion of the aerosol particles in the container no less than one turn.

The atomizers 9 are fastened to the leads-out 11 of the distributor 12 with possibility of fixed rotation inside the body 10. The leads-out 11 are fastened on the threaded rod of the distributor 12, the lower end of which is screwed into the support 13 and connected with the fitting for supply of atomizing agent 14.

The atomizers 9 are connected by means of the polychlorvinil pipes 15 with the fittings 16 of atomized product. The pipes are fixed with the help of the ring 17, the lining 18 and the nuts 19 ensure impermeability of the container of the body 10. With the help of the insertion 20 it's possible to change location of the atomizers 9 concerning height of the body 10.

At the threaded rod of the distributor 12 with the help of the nut 19 the horizontal plate – reflector 22 is horizontally fastened, the height of installation of which may be regulated by movement along the distributor 12.

If necessary, in the body of the container 10 the diffusor is mounted, which may be detachably connected by the pipeline with the ventilation system at carrying out of works on disinfection of the filters of this system or with the chamber 8, where the material treated with aerosol is located.

The vortical ejector atomizers 9 (Fig.3) contain the chamber 23 (which is cylindrical) with the tangential channels 24 for supply of compressed gas and with the axial outlet nozzle 25. Coaxially with the nozzle 25 in the chamber 23 the branch pipe 26 of liquid supply is arranged. The ratio of the elements sizes is determined with the formula $Do=(0,5\div0,7)\ Dc^2/Dk$, wherein Do is the diameter of the branch pipe 26, Dc is the diameter of the nozzle 25, Dk is the diameter of the inlet channel 24.

If the case of necessity of further transportation of aerosol, the cover 27 containing the branch pipe 28 and the lining 30 is installed on the body 10 and fastened with the butterfly-nut 29 (Fig.4).

The aerosol device works as follows. Depending on the task to be solved the necessary number of the atomizers 9 are arranged on the leads-out 11 of the distributor 12. During carrying out of works with atomization of liquid in a room or in the chamber 8 the fitting 14 is connected to the compressor 4 by means of the flexible hose; from the container 2 the liquid is supplied into the body 10, after that the compressor 4 is connected to the electricity supply network and turned in. With the help of the pressure reducer 5 the pressure in the input hose to the generator is adjusted, the pressure is regulated by the manometer 6. Atomizing air comes in via the filter 7 to the generator 1 through the fitting 14, and further through the internal channel of the support 13 via the distributor 12 comes to the ejector atomizers 9.

The tangential input of air via the channel 24 in the chamber 23 (which is vortical) of the atomizer 9 forms the involute flow, after that air comes out via the nozzle 25. At that the maximum peripheral velocities of gas are achieved nearby the surface of the branch pipe 26, and along the axis of the chamber 23 rarefication up to 0.03 MPa and the reverse flow of gas are created. At coming of air from the compressor in the chamber 23 its pressure drops, that reduces contents of water in it up to 15-20%.

Via the pipes 15 and the branch pipe 26 from the lower part of the body 10 into the chamber 23 a liquid comes with the linear speed of supply 0.15-0.6 m/sec, which is entrapped by the reverse gas flows, introduced in the zone of the maximum peripheral velocities of gas and broken by the centrifugal forces. At that the dispersed liquid, distributing in dry air, is exposed to partial dehydration.

Formed aerosol comes into the container 10 via the nozzle 25. At that the air pressure reduces, that leads to its expansion and decrease of relative humidity, that, in its turn, leads to further dehydration and reduction of the liquid drops sizes.

The chordwise arrangement of the atomizers ensures swirl of the two-phase flow inside the body 10, at that the big drops precipitate on the container walls and the reflector 22, after that flow down on the container bottom, and the small ones are taken away by the tangential air flow, which makes, at least, one turn inside the body. The tangential flow creates rarefication along the axis of the container 10, causing the inflow into the container of dry air from the room, further dehydration and reduction of the drops size, that leads to enrichment of aerosol with fraction with the particles sizes about 1 mcm. Obtained aerosol comes into the room or via the branch pipe 28 and the pipeline comes into the chamber 8, where influence onto treated material is realized. At that, since into the room the aerosol drops arrive enclosed by the air «cushion», moving with the same speed, there would not be «head-on collision» with room air, that excludes possible deactivation of labile liquids.

Industrial Application

Example 1. The study of influence of the working mode of the VAG on its efficiency and the size of the aerosol particles.

The tests were conducted using the VAG with 4 acting vortical ejector atomizers at pressure of supplied air 0.25 MPa and its consumption 300 l/min. The results of the tests on water aerosolization, in which the volume of aerosolizated liquid per time unit (M), the mass medial diameter of the drops (d_{mmd}) and the maximum diameter of the drops, constituting 95% of the generated aerosol mass ($d_{95\%}$) were determined depending on used modes, are presented in the Table 1. Three modes of the device work were used:

A – the mode with closed cover 27 and the atomizers 9 arrangement on the leads-out 11 with orientation of the sprays of liquid atomization inside the body 10, as a result of what double separation of big drops is achieved and at the exit of the generator 1 there is the finest aerosol;

B – the mode with removed cover 27 and arrangement of the atomizers 9 with orientation of the sprays of dispersed liquid inside the body 10. At that the distributor 12 is fastened in the support 13 without the insertion 20, and the atomizers 9 are arranged lower than the top edge of the body 10. In the course of aerosolization a single separation of the drops takes place on the walls of the body 10, that ensures sufficiently high aerosol dispersivity and increased, in comparison with the mode A, device efficiency.

C – the mode with removed cover 27 and arrangement of the atomizers 9 with orientation of the sprays of dispersed liquid outside the body 10.

Table 1.

Dependence of the VAG efficiency and dispersivity of generated aerosol on the modes of the generator work (average on the results of three independent measurings).

Working mode	M, ml/min	d_{mmd}, mcm	$d_{95\%}$, mcm
A	5,0±0.1	3,1±0.2	6,2±0.3
B	63±1	3,6±0.3	8,8±0.5
C	360±2	8,0±0.5	21,0±0.8

From the presented data it follows, that at change of the modes from A to B and C the VAG efficiency and the size of water aerosol drops increase in sequence.

Example 2. Dependence of the device efficiency and the size of aerosol particles on location and orientation of the vortical burner nozzle in the container body.

The experiments on aerosolization were conducted in conditions of the Example 1, the VAG worked in the mode B. The 3% water solution of sodium chloride was dispersed. The vortical ejector atomizers were arranged at height 40 mm from the body bottom and 20 mm from the surface of dispersed liquid. At that the distances (L) from the external edge of the nozzles to the internal body surface, and the angles (A) of orientation of the nozzles with respect to a horizontal plane, were changed. The results of the tests are presented in the Table 2.

Table 2.

Dependence of the generator efficiency (M) and dispersivity of generated aerosol (d) on location and orientation of the ejector atomizers.

Location of the burner nozzles		Results of the tests	
L, mm	A, degree	M, ml/min	d_{mmd}, mcm
30±1	0±2	48±1	4,7±0.3
30±1	+20±2	61±1	4,9±0.3
30±1	+90±2*	150±1	8.0±0.3
30±1	-20±2	46±1	4,3±0.3
16±1	0±2	40±1	4,3±0.3

* The aerosol spray is oriented beyond the VAG body in contrast to other orientations of the atomizers.

From the presented data it follows, that the VAG efficiency and the sizes of generated aerosol particles at dispersion of inorganic salt solution don't differ considerably from analogous values at pure water dispersion (Example 1). Change of the atomizers location changes the VAG efficiency and the sizes of generated aerosol.

Moving away of the atomizers from the wall and increase of the deviation angle of the ejector from horizontal upwards lead to increase of the device efficiency with simultaneous increase of the produced aerosol particles sizes.

Example 3. Dependence of the VAG efficiency and the mass median diameter of the aerosol particles on liquid viscosity at dispersion of organic compounds solutions.

The tests were conducted in conditions of the Example 1, the VAG worked in the mode A (Table 3) and the mode B (Table 4). The VAG efficiency (M,ml/min)was measured and the mass median diameter of the aerosol particles (d_{mmd}) at dispersion of model liquid – water solutions of glycerin with viscosity from 1 (water) up to 300 (91% solution of glycerin) centipoise at the temperature 20±1°C.

Table 3.

Dependence of the VAG efficiency and the mass median size of the aerosol particles on viscosity of dispersed liquid (mode A).

Glycerin concentration, %	Solution viscosity, cP	M, ml/min	d_{mmd}, mcm
0,0	1,0	12,0	4,4
4,6	1,1	11,5	3,7
10,0	1,3	10,5	3,1
23,0	1,6	8,5	2,9
46,0	3,9	8,0	2,6
84,0	100	3,0	2,1
91,0	300	2,0	1,9

Table 4.

Dependence of the VAG efficiency and the mass median size of the aerosol particles on viscosity of dispersed liquid (mode B).

Glycerin concentration, %	Solution viscosity, cP	M, ml/min	d_{mmd}, mcm
0,0	1,0	48,0 ±0,2	6,0± 0,5
10,0	1,3	41,2 ±0,2	5,1± 0,5
25,0	2,1	34,0 ±0,3	4,1± 0,5
40,0	3,8	32,1 ±0,2	4,0± 0,5
60,0	11,0	24,0 ±0,2	3,0± 0,5
80,0	62,0	12,4 ±0,2	1,7± 0,5
91,0	300	8,4 ±0,2	1,0± 0,5

From the presented data it follows, that at increase of viscosity of the organic compound solution the VAG efficiency decreases as well as the sizes of the generated aerosol particles. In all the cases uniform in time dispersion of solutions at stable work of the VAG was observed.

Example 4. Use of the VAG for aerosolization of solutions foaming in the process of dispersion.

The researches were conducted in conditions of the Example 1 with removed cover in the mode B. The solutions to be aerosolizated were those of bovine serum albumin (BSA) at change of its contents from 2 up to 20 g/l, intensively forming a great volume of foam inside the VAG body at supply of compressed air and intensive mixing of the solution. The VAG efficiency was measured – the volume of aerosolizated liquid (M) and the mass median diameter of the aerosol particles (d_{mmd}). The obtained results are presented in the Table 5.

Table 5.

Dependence of the VAG efficiency and the mass median size of the aerosol particles on BSA contents in dispersed liquid.

BSA contents, g/l	M, ml/min	d_{mmd}, mcm
0	60±1	4,0±0,3
2±0,1	56±3	4,1±0,4
20,0±0,1	57±5	3,9±0,4

From the presented data it follows, that the VAG efficiently generates aerosol in presence of a foaming ingredient, i.e. in conditions embarrassing work of other aerosol generators. In the observed range of BSA concentrations all the solutions were dispersed with practically identical result.

Example 5. Aerosolization of mixed solutions, including organic and inorganic components.

The researches were conducted in conditions of the Example 1, the VAG worked in the mode B. The solution to be aerosolizated was one containing 75% mass. of water, 20% mass. of glycerin and 5% mass. of sodium chloride. The obtained results are presented in the Table 6.

Table 6.

Comparison of the results of aerosolization of water and water solution, containing 20% mass. of glycerin and 5% mass. of sodium chloride.

Aerosolizated liquid	M, ml/min	d_{mmd}, mcm
Water	49±1	4,7±0,3
Water solution of glycerin and NaCl	36±1	4,1±0,5

From the obtained data it follows, that the VAG may be successfully applied for aerosolization of multi-component solutions. The differences in the results of aerosolization are conditioned by difference of solutions viscosity.

Example 6. Aerosolization of the heterogeneous systems.

The researches were conducted in conditions of the Example 1, the generator worked in the mode B. Aerosolization was applied to:

1. reverse water-in-oil emulsion, containing mineral oil with viscosity 70 centipoise at 20°C – 60% mass; emulsifier T-2 – 10% mass.; water- 30% mass. (hereinafter – emulsion);
2. suspension of calcium carbonate, obtained in the result of mixing 70 ml of water, 5 ml of 20% water solution of calcium chloride and 80 ml 5% water solution of sodium hydrocarbonate (hereinafter – suspension);
3. 3% water solution of sodium chloride and water (base of comparison).

The obtained results are presented in the Table 7.

Table 7.

Comparison of the results of aerosolization of water solution of sodium chloride and the heterophasis systems.

Liquid	M, ml/min	d_{mmd}, mcm
Water	40±1	4,3±0,3
NaCl solution	48±1	4,7±0,3
Emulsion	27±3	3,7±0,3
Suspension	51±2	5,9±0,3

The obtained results are evidence of possibility of using the VAG for atomization of suspension and emulsions. At that, as a result of intense mixing of dispersed liquid in the VAG body it keeps its uniformity in the aerosolization process.

The presented results are evidence of the fact that, in contrast to the known analogues, the declared device is more universal and may be used for obtaining of fine aerosol practically on the base of all the liquid compositions, including emulsions and suspensions.

Claims:

1. An aerosol generating device for generating and mixing particles having a diameter of 5 μm or less into air; said device comprising:

a cylindrical container, having a bottom connected circumvolvingly to a wall which connects said bottom with a top edge to define a container chamber and an open top; and

at least one ejector atomizer positioned within said container chamber, said at least one ejector atomizer having an internal wall which defines an internal mixing chamber and an outlet opening, said internal mixing chamber configured to receive a liquid to be atomized from a liquid supply branch pipe through a liquid supply branch pipe opening, and to permit mixing of the liquid with pressurized air delivered to the internal mixing chamber from an air supply branch pipe through an air supply branch pipe opening positioned coaxially to the internal mixing chamber, each of said liquid supply branch pipe opening, said outlet opening and said air supply branch pipe opening having a respective diameter, said air supply branch pipe opening positioned so as to deliver air tangentially with respect to said internal wall; the ratio of the values of the cross-sections of the branch pipe openings of air and liquid and the outlet opening of the ejector atomizer is defined by the equation $Do=(0.5\div0.7)Dc^2/Dk$, wherein Do is the diameter of the liquid supply branch pipe opening, Dc is the diameter of the outlet opening, and Dk is the diameter of the air supply branch pipe opening; wherein the liquid supply branch pipe opening and the air supply branch pipe opening are positioned within the internal mixing chamber in such a way so as to direct a jet of an aerosol discharge consisting of liquid particles suspended in air to be chordwisely oriented with respect to the internal wall of the internal mixing chamber, so that the projection of the central axis of the aerosol discharge on the internal wall of the internal mixing chamber does not cross a top edge of the internal wall of the internal mixing chamber; whereby the aerosol discharge is created and dispersed in a tangential vortical motion which creates partial dehydration and reduction of the liquid particles' size prior to exiting said outlet opening.

2. The aerosol generating device of claim 1 further comprising a cover adapted to connect to said top edge of said cylindrical container, said cover further defining a cover opening.

3. The aerosol generating device of claim 2 wherein said container chamber contains another liquid and wherein the aerosol generating device further comprises a reflector plate positioned within said container chamber at a position higher than a top surface of the other liquid positioned within said container.

4. The aerosol generating device of claim 3 further comprising at least two ejector atomizers, each of said ejector atomizers configured to be variably adjustable with respect to a horizontal plane.

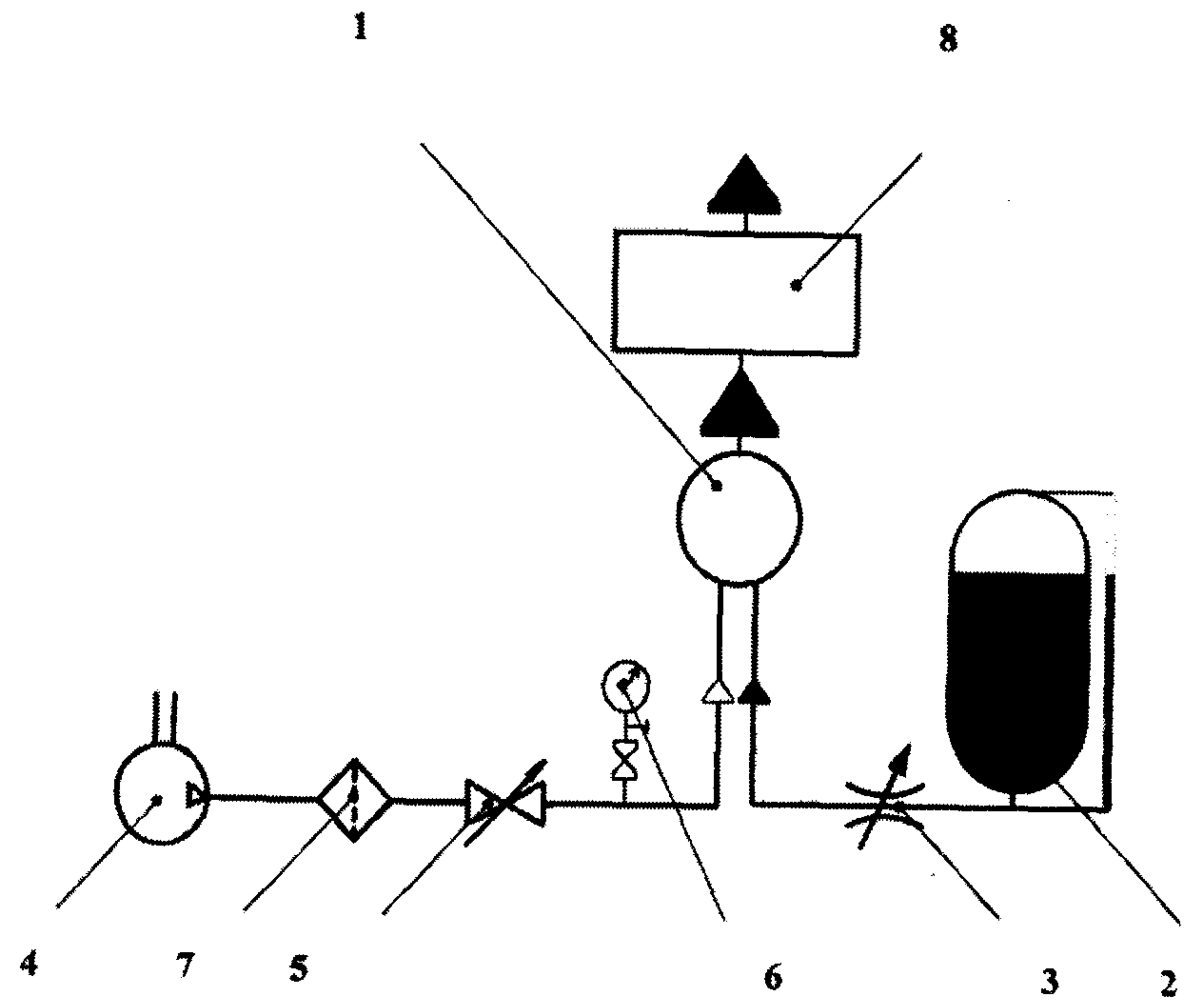


Figure 1

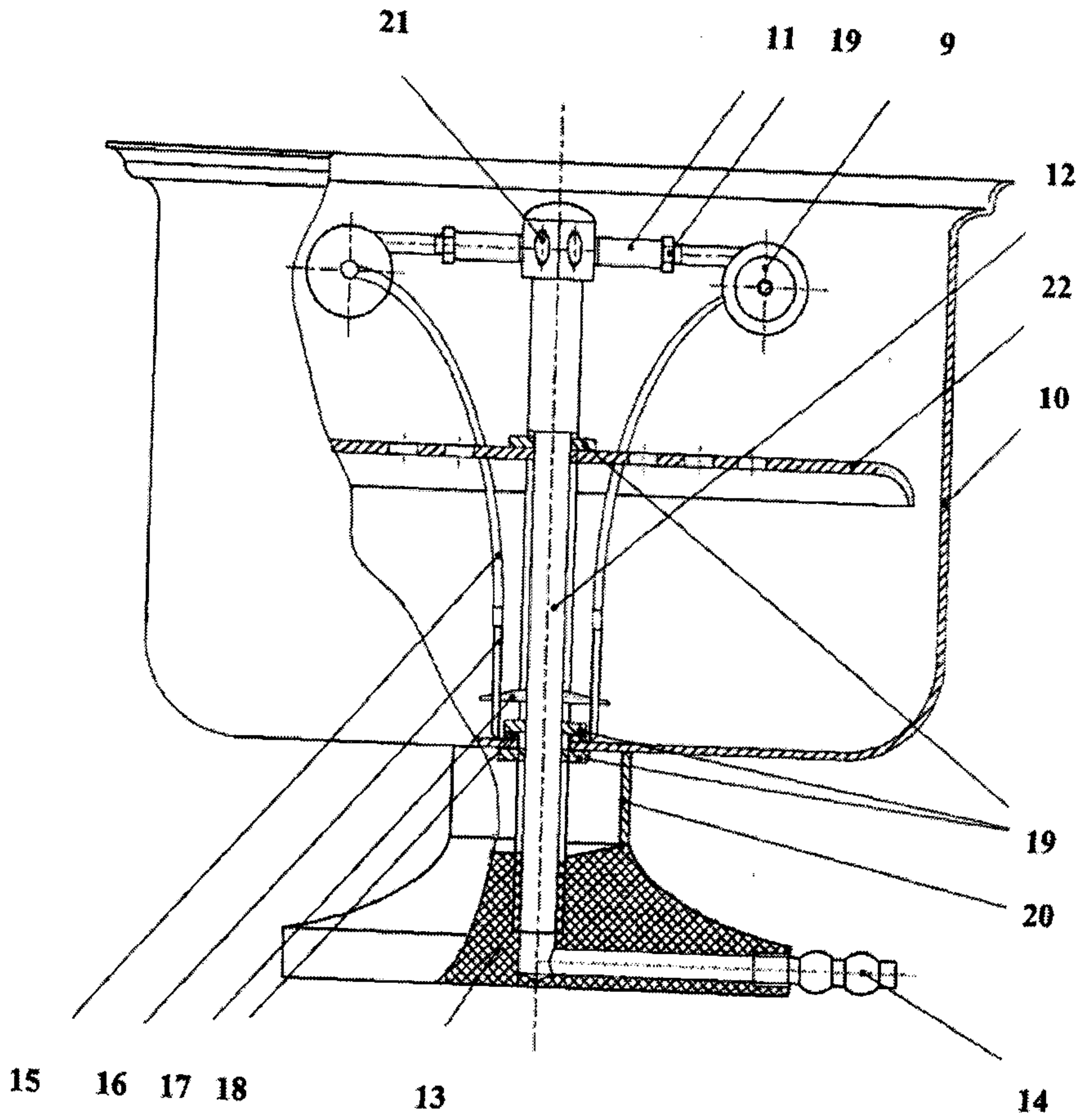


Figure 2

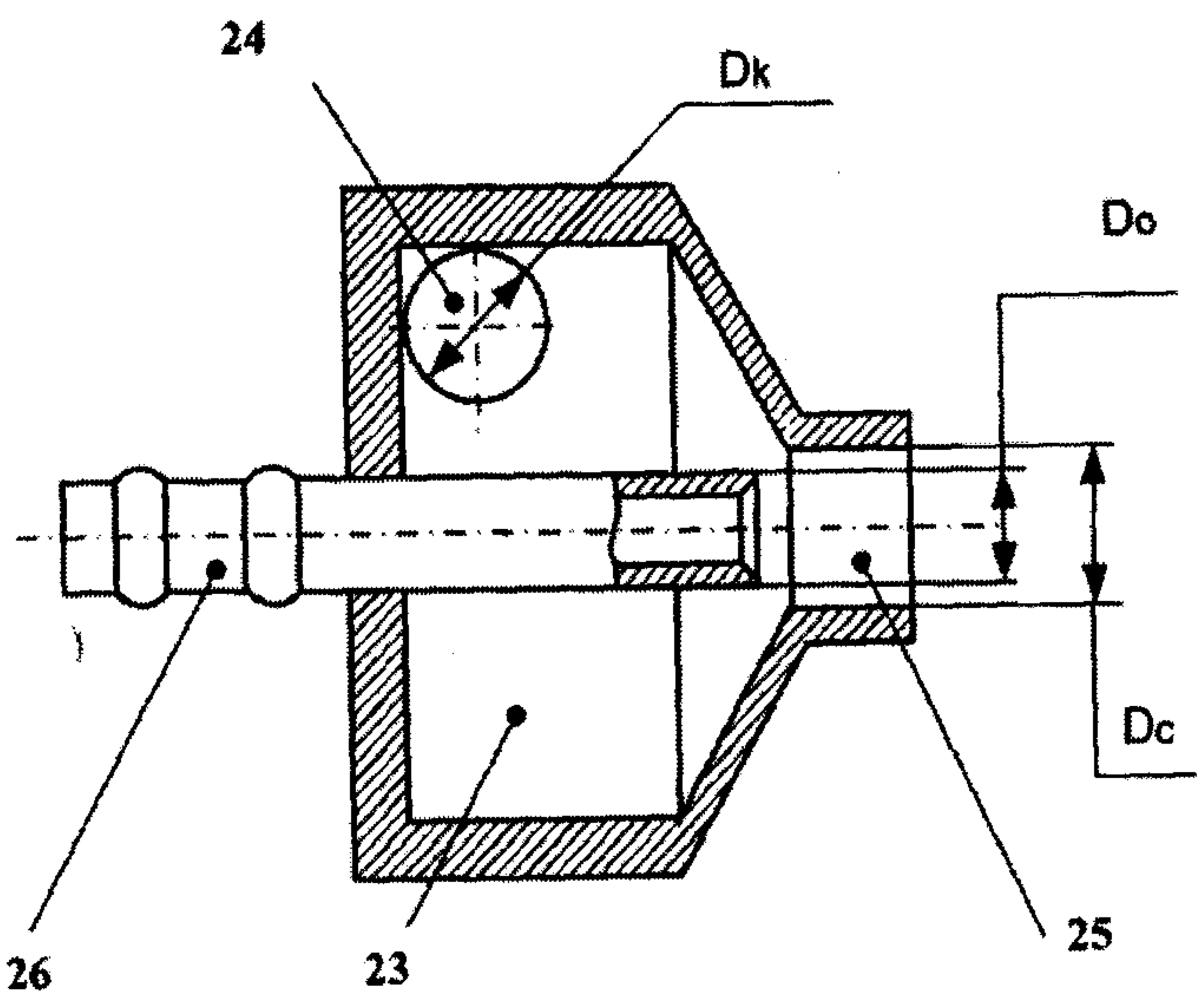


Figure 3

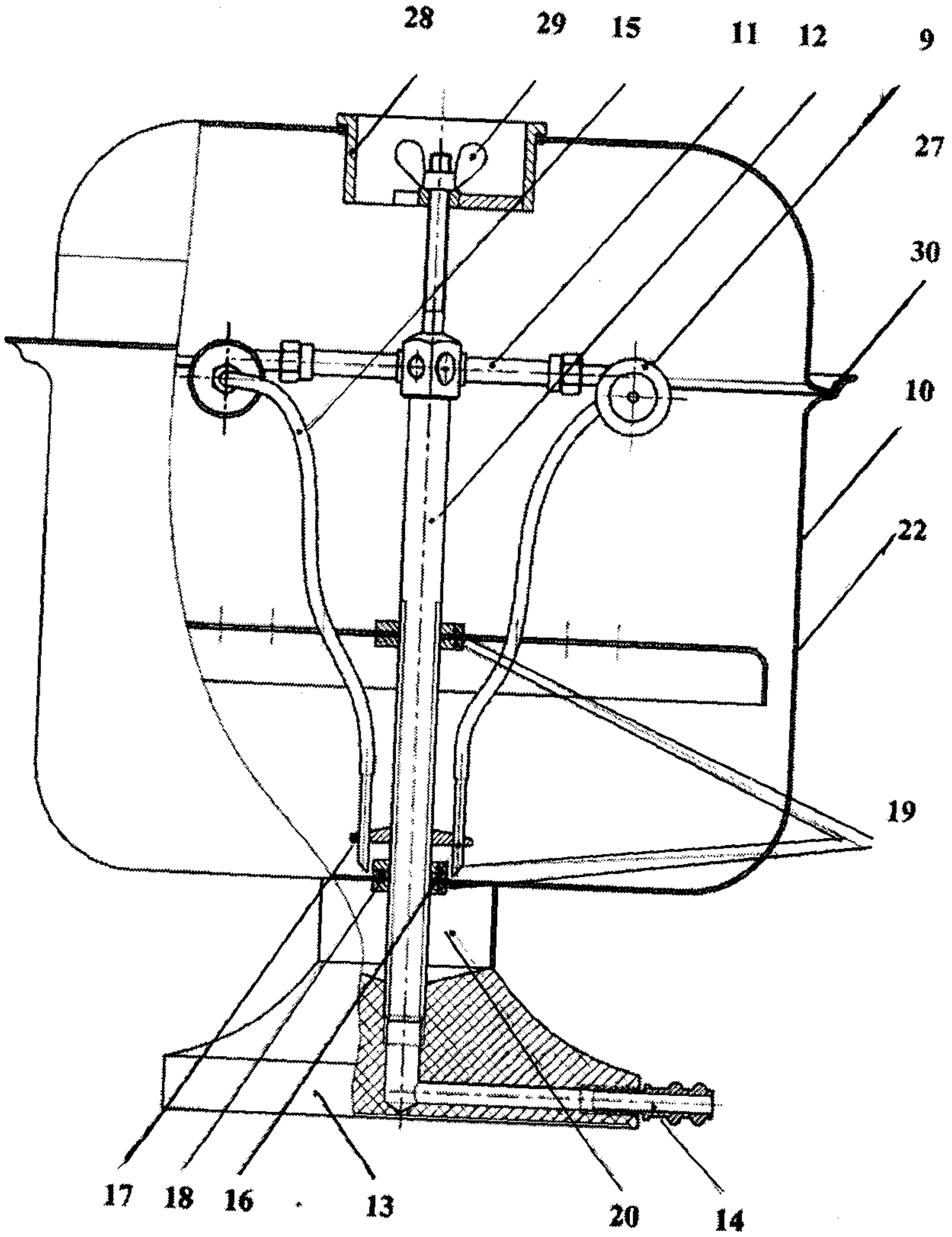
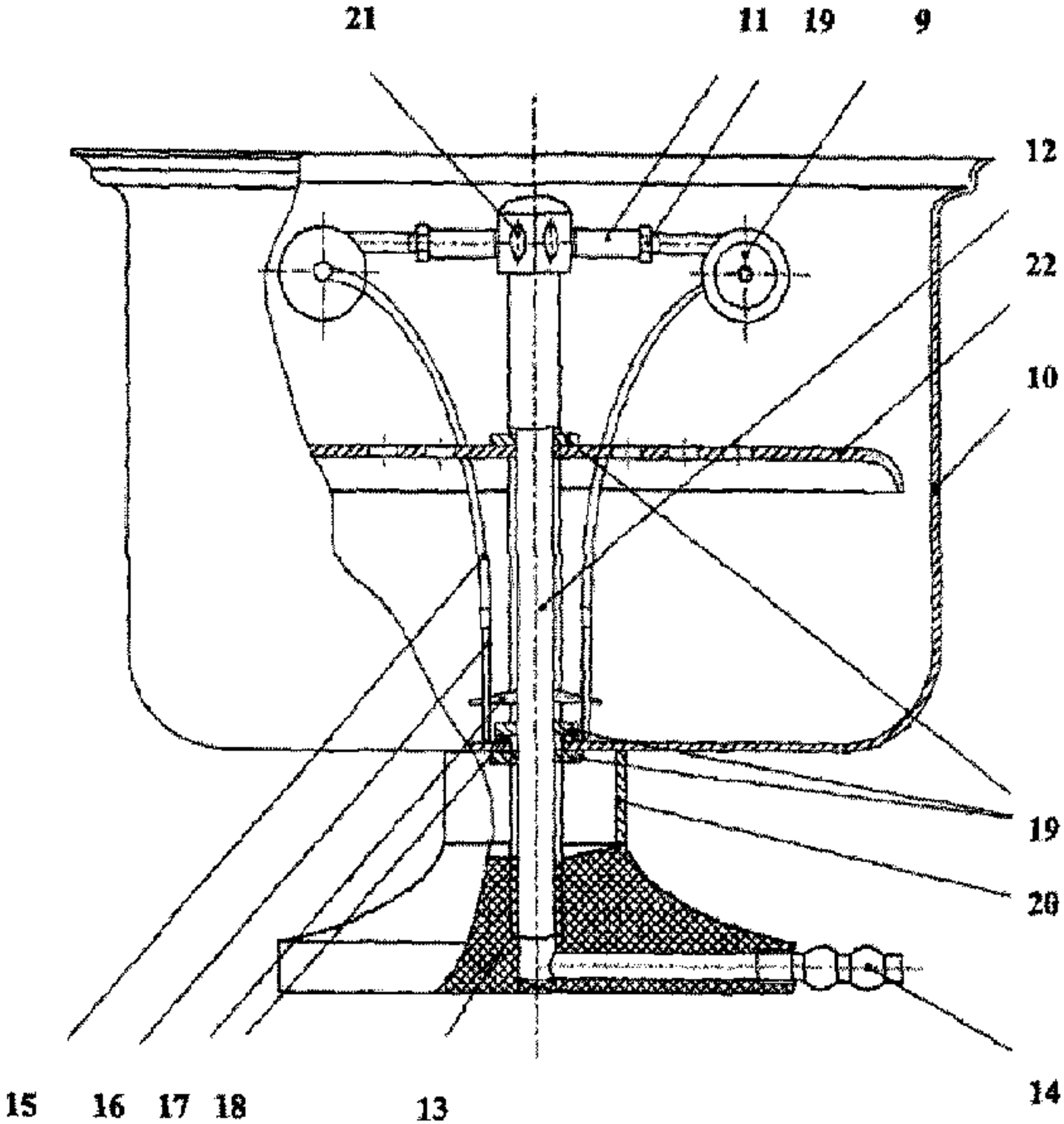


Figure 4



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