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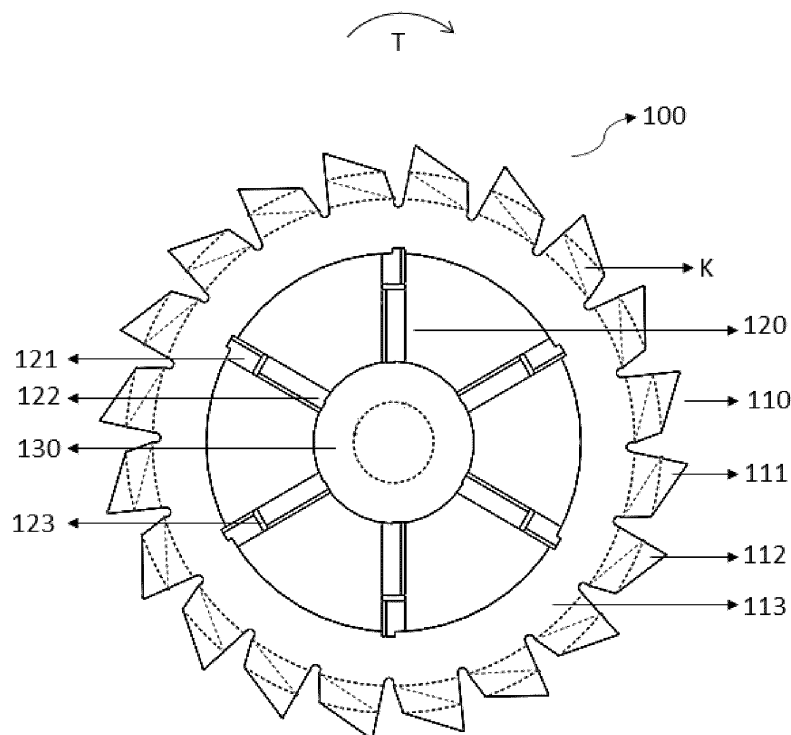
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A.S.****35730 Kemalpaşa İzmir (TR)**(54) **MIXING TANK IMPELLER**

(57) A disintegrating and dispersing impeller used as a mixing tank impeller having to disintegrate and mixing parts for homogeneously dispersing by disintegrating insoluble, soluble, and limitedly soluble liquids or particles

in a fluid with a certain viscosity value in to improve their physical, chemical or mechanical properties, the impeller having mixer deflectors (120) having a separator structure (123) between them to create a layer-sliding effect.

**Figure – 1**

**Description****Technical field of the invention:**

**[0001]** The invention relates to a mixing tank impeller enabling the homogeneous mixing of fluids having a specific viscosity range comprising particles and/or liquid to improve or change their physical, chemical or mechanical properties in various chemical processing fields.

**[0002]** In particular, the invention relates to a disintegrating and dispersing impeller enabling the homogeneously dispersing of insoluble, soluble, and limitedly soluble liquid or particles in the fluid by disintegrating in a fluid having a certain viscosity range to improve or change their physical, chemical or mechanical properties.

**State of the Art:**

**[0003]** Paints are organic coating materials that contain pigments which are non-soluble in an organic binder. Paints also known as organic coatings are chemical substances that are applied to the desired surface for protection, coating or decorative purposes in liquid or powder form by applied with various methods and form a film of a certain thickness on the surface to which they are applied. Paints, which have various properties in line with the needs and usage area in the paint industry, generally comprise pigment, solvent, binder, fillers, and additives groups.

**[0004]** In the paint and coating industry, there are different types of paints according to various properties and usage areas. In Table 1, there are paint groups and varieties according to their different usage areas or properties.

Table 1: Paint Groups and Varieties

Paint Groups	Varieties
According to the Drying Method	Paints with Physical Drying
	Paints with Chemical Drying
According to the Usage Areas	Construction Paints
	Aircraft Paints
	Wood Paints
	Floor Paints
	Marine Paints
	Art Paints
	Automotive Refinish Paints
	Coil/Can Paints
	Protective (Structural Steel) Paints
	General Industrial Paints
	Wheel Rim Paints
	Train Rail Paints
	Food Paints
	Automotive Paints
	Marking Paints
	Textile Paints
	Metal Paints
	Plastic Surface Paints
According to the Solvent Used	Waterborne Paints
	Solvent-Based Paints
	Cellulosic Paints

(continued)

Paint Groups	Varieties
According to the Type of Resin Used	Acrylic Paints
	Epoxy Paints
	Synthetic Paints
	Alkyd Paints
	Polyurethane Paints
	Rapid Paints
	UV Paints
	Polyester Paints
	Heat Resistant Paints
	Paints with Oven-Drying
	Paints with Moisture-Curing
	Paints with Acid-Curing

**[0005]** Even though paints as known as organic coatings are divided into various groups according to their usage areas and properties, all paints comprise the same basic components.

**[0006]** Paints are chemicals that form a continuous, solid and adherent thin film on the surface on which the paint is applied by the volatilization of the solvent in their content or the transformation from the liquid state to the solid state as a result of the reaction. Pigments and fillers are homogeneously dispersed in the liquid phase of the paint. UV additive packages (UV absorber - HALS), resin and special additives, functional pigments, and fillers in the paint increase the paint's hardness, durability, gloss, adhesion, and resistance to sunlight, weather conditions and chemicals. Most of the functional properties of paints such as drying time, adhesion, durability, flexibility, chemical resistance, and hardness are determined by the type of binder and additive packages, which are the backbone of the paint. Solvents are organic or inorganic materials and are used to dilute the paint and bring it to the application viscosity by dissolving the paint components, whether solid or liquid. Fillers, another component of paints, are used to increase the applied thickness and solid amount, reduce cost and gain durability on the surface where the paint is applied. Additives are chemicals added to the paint to gain the desired properties of it and to improve its existing properties of it.

**[0007]** Pigments, another basic component of paints, are chemicals consisting of particles in the form of powder or granule that enable the paint gains properties such as colour, opacity, solidity, durability and resistance to corrosion. Since pigments are insoluble chemicals that are dispersed in the substance, they must be dispersed homogeneously in the paint by disintegrating because they add colour or mechanical properties to the paint.

**[0008]** Various mixing impellers with blades are used in the paint industry to disintegrate insoluble pigments, solid fillers and additive packages in the paint and to disperse them homogeneously with other additives. The mixing impellers comprise blades with cutting properties for disintegrating the pigment particles in the paint and mixer blades to enable homogenization. The cutting blades of the mixing impellers, with their material of manufacture and the geometry they have, enable the disintegrating of the particles in the paint during their movements in radial or axial directions. Cutting blades are used for the disintegration of pigments like other solid agglomerates/aggregates or additives as well. Agglomerates/aggregates disintegrate as a result of the separation of stratified masses as a result of the cutting force and collision with an incoming mass with the speed they gain depending on the cutting slope factors. To show the properties of the paint throughout the mixture, all organic or inorganic chemical components must be homogeneously disintegrated and homogeneously dispersed in the paint. For this reason, the mixer tips also contain mixer blades for the homogeneous spreading of the particles homogeneously disintegrated by the cutting blades, in the paint. Mixer blades both contribute to the movement of the particles during disintegration and enable the homogeneously dispersing of the disintegrated particles in the paint, by forming vortices and flow lines in the radial or axial direction in the paint according to the shape and orientation directions. In high viscous paints, the required rotation speed, the flow directions within the flow regime, and the required power and homogenisation time are important for the disintegration of particles by moving and for the homogeneous dispersion of the disintegrated particles.

**[0009]** Patent document no "TR2021021776" in the state of the art is reviewed. "When the reasons for the paint film thickness on the work pieces subjected to the painting process after the production processes are not at the desired value are investigated, it is determined that this situation is caused by the inhomogeneous mixing of paint and thinner

in the paint mixture. It was observed that the mixers used for the mixture were not sufficient to enable homogeneity. In this context, in said invention, a paint mixer is designed for the mixture can be homogeneous. It has been observed that the designed paint mixer also reduces the use of thinner." information takes part in the abstract part of the invention that is the subject of the application. Said invention discloses a mixer tip on a rotating shaft which provides homogenisation and mixing by means of main and auxiliary vanes, and which has a certain distance between its ends at an angle of 180 degrees. While said mixer's impeller tip does not enable the disintegration of the basic components used in the paint, it creates a layer-sliding effect by creating a radial angle in one direction at different points in the paint.

**[0010]** Patent document no "TR201110775" in the state of the art is reviewed. The information that reads: "The present invention relates to a shaking and mixing apparatus that enables the homogeneous mixing of liquid-liquid or solid-liquid mixtures, such as foods, pharmaceutical mixtures, omelette mixtures, protein powders, chocolate milk, and medicines to be dissolved in liquid or paints to be dissolved in liquid. The mixer comprises a body in which the materials to be mixed are placed, at least one opening on the body that enables the materials to be placed inside the body, at least one lid placed over the opening to prevent leakage of materials through the opening in the body during shaking, the protrusion or protrusions on the surface of the lid facing the inside of the body, that is hit by the materials during shaking, thus helping the materials to mix better with each other and the solid or powder particles to dissolve better in the liquid, and a protector on the surface of the lid facing the inside of the body, which prevents materials from leaking out through gaps that may remain between the lid and the body during shaking." is given in the abstract part of the invention that is the subject of the application. Said invention discloses a mixer with protruding structures on the lower and upper lid for the dissolution and mixing of various particles in the liquid. In said invention, it is disclosed that the homogeneous mixing process is performed by shaking, while the invention has fixed protrusions under the lid for disintegration of the particles.

**[0011]** Utility model document no "CN207356952U" in the state of the art is reviewed. In the invention that is the subject of the application, there is mentioned that a high-speed dispensing and mixing disc comprising a master connecting rod, blade, first connecting rod, connecting rod, second connecting rod, upper dispersing disc, lower dispersing disc, and a zigzag strip. Said dispersing and mixing aim the disintegration of the particles in the paint by enabling the single direction sliding of the layers formed by the radial velocities of the blade and zigzag strips of the disc. Since the invention that is the subject of said utility model performs the disintegration and dispersion of the particles in the paint with the layer sliding effect in a single direction, longer times are required for the particles to be homogeneously dispersed in the paint. In addition, the number of impellers disclosed in said invention is two, which creates a higher power requirement.

**[0012]** Utility model document no "CN202343134U" in the state of the art is reviewed. In the invention that is the subject of the application, there is mentioned that a mixing tool comprising the support of a blade and arranged in a cylindrical mixing bowl, in accordance with the height direction of the mixing bowl. Said invention comprises blades extending in pairs in three directions at an angle of 120 degrees, and blades which may be triangular, square or circular, forming an angle of 15-30 degrees with the blade support. Since the invention that is the subject of said utility model does not comprise a tooth structure, it performs the dispersion of the aggregated structures in the paint in the radial and axial direction rather than the effect of disintegrating solid agglomerates and aggregates. Since the disintegration effect of the particles with different hardness and disintegration values and energies in the paint will not be realised only by layer sliding effect, it must have blades like saw-type gears.

#### The aim of the invention:

**[0013]** The most important aim of the invention is to enable the homogeneous dispersion of particles insoluble with a solvent in fluids having a certain viscosity, such as paint, by disintegrating in the fluid with its disintegrator and mixer sections. Thus, the particles are disintegrated faster and homogeneously dispersed, enabling the fluid with the desired physical, chemical and mechanical properties to be prepared in a shorter time.

**[0014]** Another aim of the invention is to enable the particles to be disintegrated or broken with the effect of momentum thanks to the upward and downward-inclined disintegrator tooth structures of the disintegrator part of the invention. Thus, it enables all the particles added to the fluid to be effectively disintegrated and dispersed.

**[0015]** Another aim of the invention is to create the radial and axial directional vortex effect required for the particles in the fluid to be disintegrated by hitting the disintegrator teeth with a momentum effect thanks to the mixer deflectors it has. Thus, it enables the disintegrator teeth to disintegrate all the particles more easily and quickly with the momentum effect.

**[0016]** Another aim of the invention is to enable the mixing of the disintegrated particles by homogeneously dissolving in the fluid with the effect of layer sliding in radial and double axial directions by means of the mixer deflectors of the invention. Thus, it enables the disintegrated particles to dissolve more quickly and effectively in the fluid in all directions of movement.

**Description of Figures:**

[0017]

5 **FIGURE-1** is the drawing giving the top view of the disintegrator and disperser impeller that is the subject of the invention.

**FIGURE-2** is the drawing giving the top view of the details of the distance parameters of the disintegrator and disperser impeller that is the subject of the invention.

10 **FIGURE-3** is the drawing giving the top view of the details of the disintegrator and disperser impeller that is the subject of the invention.

15 **FIGURE-4** is the drawing showing the details of the deflector structure of the disintegrator and disperser impeller that is the subject of the invention.

**FIGURE-5** is the drawing showing the computational fluid dynamics model analysis of the disintegrator and disperser impeller that is the subject of the invention.

20 **Reference numbers:**

[0018]

- 25 **100.** Disintegrator and Disperser Impeller
- 110.** Disintegrator Tooth
- 111.** Upward Disintegrator Tooth
- 112.** Downward Disintegrator Tooth
- 113.** Connection Body
- 120.** Mixer Deflector
- 30 **121.** Small Deflector
- 122.** Big Deflector
- 123.** Separator Structure
- 130.** Connection Tip
- A.** Radius of The Disintegrator and Disperser Impeller
- 35 **B.** Tooth Radius of The Connection Body
- C.** Cutting Radius of The Disintegrator Tooth
- D.** Inner Radius of The Connection Tip
- E.** Outer Radius of The Connection Tip
- F.** Inner Radius of The Connection Body
- 40 **G.** Diameter Between Disintegrator Teeth
- H.** Mixer Deflector Width
- I.** Small Deflector Length
- J.** Big Deflector Length
- K.** Curling Lines
- 45 **M.** Centre
- T.** Direction of Rotation
- $\alpha$ . Curling Angle
- $\beta$ . Inclination Angle
- $\theta$ . Inclination Angle of The Small Deflector
- 50  $\varnothing$ . Inclination Angle of The Big Deflector

**Description of the invention:**

55 **[0019]** The invention relates to a disintegrator and disperser impeller (100), comprising; disintegrator teeth (110) comprising upward disintegrator teeth (111) and downward disintegrator teeth (112) positioned in successive rows and an annular connection body (113); a mixer deflector (120) comprising a small deflector (121) and a big deflector (122) with different lengths inclined in opposite directions and separated from each other by a separator structure (123); and an annular connection tip (130).

**[0020]** The disintegrator teeth (110) enable the disintegration of particles added to the fluid in order to change the physical and mechanical properties of the fluid. The particles in the fluid must be disintegrated and mixed to dissolve and disperse homogeneously in the fluid. The disintegrator teeth (110) comprise upward disintegrator teeth (111) and downward disintegrator teeth (112), which surround the annular connection body (113) by successively and respectively curving along the curl lines (K) in the upward and downward directions to the surface axis of the connection body (113) with a curling angle ( $\alpha$ ) of  $15^\circ$  from the surface at a distance from the centre (M) of the connection body (113) equal to the tooth radius of the connection body (B). The upward disintegrator teeth (111) and the downward disintegrator teeth (112) have the same geometrical structure, only their directions are opposite to each other. The downwardly curling downward disintegrator teeth (112) are curled towards the surface facing the bottom of the mixing bowl. The edges of the upward and downward extending structures of the upward disintegrator teeth (111) and the downward disintegrator teeth (112) in the clockwise direction of rotation (T) lie at an inclination angle ( $\beta$ ) of  $20^\circ$ , and the edges of the upward and downward extending structures of the upward disintegrator teeth (111) and the downward disintegrator teeth (112) that are opposite to the direction of rotation (T) lie straight. Disintegrator that disintegrates the particles in the fluid by being located at the tip of the disintegrator teeth (110) has an inclined edge. The edge of said inclined edge in the direction of rotation (T) is short, and the edge of said inclined edge that is opposite to the direction of rotation (T) is long. The endpoint of the short edge is equal to the distance from the centre (M) to the radius of the disintegrator and disperser impeller (A), and the endpoint of the long edge is equal to the distance from the centre (M) to the cutting radius of disintegrator tooth (C). The disintegrating inclined edge, which disintegrates the particles in the fluid by locating at the tip of the disintegrator teeth (110), is the line connecting the endpoint of the short edge whose distance from the centre (M) is equal to the radius of the disintegrator and disperser impeller (A) and the endpoint of the long edge whose distance from the centre (M) is equal to the cutting radius of disintegrator tooth (C). There is a gap between the upward disintegrator teeth (111) and the downward disintegrator teeth (112) equal to the diameter between the disintegrator teeth (G). The connection body (113) has a width equal to the difference between the distance from the centre (M) equal to the tooth radius of the connection body (B), and the distance from the centre (M) equal to the inner radius of the connection body (F). As can be seen from the top view shown in Figure-2, the curling angle ( $\alpha$ ) value disclosed here refers to the angle of the centre (M) point axis to the vertical axis. The top view shown in Figure-2 shows that when the disintegrator and disperser impeller (100) are connected, the surface close to the connection point is the top surface.

**[0021]** There are mixer deflectors (120) between the surface where the inner radius of the connection body (F) of the connection body (113) is located and the surface where the outer radius of the connection tip (E) of the connection body (113). As can be seen in Figure-4, the mixer deflectors (120) comprise a small deflector (121), a big deflector (122) and a separator structure (123) separating the small deflector (121) and the big deflector (122), having different directions with an angle difference of  $90^\circ$  between each other. The mixer deflector (120) and the big deflector (122) are connected to the connection tip (130); the small deflector (121) is connected to the connection body (113). The small deflector (121) is positioned at an angle of  $45^\circ$  to the direction of rotation (T), which is the inclination angle of the small deflector ( $\theta$ ). The big deflector (122), on the other hand, is positioned at an angle of  $135^\circ$  to the direction of rotation (T), which is the inclination angle of the big deflector ( $\emptyset$ ). The big deflector length (J) is twice the small deflector length (I). In this way, the homogeneous dispersion of the particle fragments in the fluid is provided by creating the layer-sliding effect in both directions in the axial axis as well as the radial direction. When the disintegrator and disperser impeller (100) is rotated according to the direction of rotation (T), the disintegrator and disperser impeller (100) enables the fluid to move in both directions of the axial axis, since the small deflector (121) causes downstream vorticity, and the big deflector (122) causes upstream vorticity.

**[0022]** The width of the connection tip (130) is equal to the difference between the distance from the centre (M) equal to the outer radius of the connection tip (E) and the distance from the centre (M) equal to the inner radius of the connection tip (D). The connection tip (130) has a surface having a distance from the centre (M) equal to the inner radius of the connection tip (D) enables the disintegrator and disperser impeller (100) to be connected with a movable element for moving in the direction of rotation (T). This surface which is placed a distance from the centre (M) equal to the inner radius of the connection tip (D) can be a grooved surface. The big deflector (122) part of the mixer deflector (120) is connected from the surface at a distance from the centre (M) of the connection tip (130) equal to the outer radius of the connection tip (E).

**[0023]** The length and diameter values of the disintegrator and disperser impeller (100), the details of which are shown in Figure-2, vary depending on the type of particle used, the type of fluid, and the amount of production. The radius of the disintegrator and disperser impeller (A) can vary between 35-350 millimetres, the tooth radius of the connection body (B) can vary between 28-315 millimetres, the cutting radius of the disintegrator tooth (C) can vary between 42-385 millimetres, the inner radius of the connection tip (D) can vary between 7-52.5 millimetres, the outer radius of the connection tip (E) can vary between 10.5-105 millimetres, the inner radius of the connection body (F) can vary between 24.5-245 millimetres, the diameter between disintegrator teeth (G) can vary between 1-11 millimetres. The parameters of the mixer deflector (120) detailed in Figure-3 are as follows; the mixer deflector width (H) can vary between 7-35 millimetres, the small deflector length (I) can vary between 4.5-46.5 millimetres, and the big deflector length (J) can vary

between 9-93 millimetres. Depending on the area of use, the wall thickness of the disintegrator and disperser impeller (100) made of AISI 304, 316, 316L stainless steel, carbon steel, composite material, plastic and Teflon, and polymeric materials can vary between 2-4 millimetres, while the number of disintegrator teeth (110) can vary between 12-22.

**[0024]** Figure-5 shows the result of the analysis of the disintegrator and disperser impeller (100) with the computational fluid dynamics model. As can be seen from the contour graph in the result of the analysis, the fluid moves in the radial and bidirectional axial directions.

## Claims

1. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion, and dissolution of particles added into the fluid at atmospheric pressure, comprising;

- A disintegrator tooth (110) enabling the disintegration of particles in the fluid, surrounding the annular connection body (113) by curving along the curl lines (K) in the upward and downward directions to the surface axis of the connection body (113) with the curling angle ( $\alpha$ ) from the surface at a distance from the centre (M) of the connection body (113) equal to the tooth radius of the connection body (B), the edges of which in the direction of rotation (T) are inclined by the inclination angle ( $\beta$ ), and the edges opposite to the direction of rotation (T) are straight, comprising upward disintegrator teeth (111) and downward disintegrator teeth (112) having a disintegrating inclined surface at the tips that disintegrated particles in the fluid, having the same geometrical structure, which are arranged in successive rows, one in the upward and then one in the downward, with a gap between them equal to the diameter between disintegrator teeth (G), disintegrating particles in the fluid, and having an inclined edge,

- A connection body (113) with a hollow ring structure in the middle, located between the disintegrator teeth (110) connected on the surface located at a distance from the centre (M) equal to the tooth radius of the connection body (B) and the mixer deflectors (120) connected on the surface located at a distance from the centre (M) equal to the inner radius of the connection body (F),

- Mixer deflectors (120) enabling the homogeneous dispersion of the particle fragments in the fluid by creating the layer-sliding effect in both directions in the axial axis as well as the radial direction, having different directions with an angle difference of  $90^\circ$  between each other, having a separator structure (123) between them to separate them from the direction of each other and having twice the length of each other, comprising a big deflector (122) positioned in the direction of rotation (T) with an inclination angle of the big deflector ( $\emptyset$ ) to create an upward vortex and a small deflector (121) positioned in the direction of rotation (T) with an inclination angle of the small deflector ( $\theta$ ) to create a downward vortex,

- A connection tip (130) connected with a movable element from the surface located at a distance from the centre (M) equal to the inner radius of the connection tip (D) for the movement of the disintegrator and disperser impeller (100) in the direction of rotation (T), and connected to the mixer deflectors (120) from its surface located at a distance from the centre (M) equal to the outer radius of the connection tip (E), and its width is equal to the difference between the distance from the centre (M) equal to the outer radius of the connection tip (E) and the distance from the centre (M) equal to the inner radius of the connection tip (D).

2. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; the curling angle ( $\alpha$ ) is  $15^\circ$ .

3. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; the inclination angle ( $\beta$ ) is  $20^\circ$ .

4. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; the radius of the disintegrator and disperser impeller (A) is between 35-350 millimetres.

5. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; the tooth radius of the connection body (B) is between 28-315 millimetres.

6. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; the cutting radius of the disintegrator tooth (C) is between 42-385 millimetres.

7. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; the inner radius of the connection tip (D) is between 7-52.5 millimetres.
- 5 8. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; the outer radius of the connection tip (E) is between 10.5-105 millimetres.
- 10 9. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; the inner radius of the connection body (F) is between 24.5-245 millimetres.
- 15 10. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; the diameter between disintegrator teeth (G) can vary between 1-11 millimetres.
- 20 11. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; the mixer deflector width (H) is between 7-35 millimetres.
- 25 12. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, comprising; a small deflector (121) with a length between 4.5-46.5 millimetres.
- 30 13. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, comprising; a big deflector (122) with a length between 9-93 millimetres.
- 35 14. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; it is made of AISI 304, 316, 316L stainless steel, carbon steel, composite material, plastic and Teflon or polymeric material.
- 40 15. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; it has a wall thickness of 2-4 millimetres.
- 45 16. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, comprising; disintegrator teeth (110) with 12-22 teeth.
- 50 17. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1 or Claim 16, comprising; disintegrator teeth (110) comprising an equal number of upward disintegrator teeth (111) and downward disintegrator teeth (112).
- 55 18. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, comprising; upward disintegrator teeth (111) curving upwards from the curl lines.
19. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, comprising; downward disintegrator teeth (112) curving downwards from the curl lines.
20. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; the big deflector length (J) is twice the small deflector length (I).
21. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; the inclination angle of the big deflector ( $\varnothing$ ) is 135°.



22. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; the inclination angle of the small deflector ( $\theta$ ) is  $45^\circ$ .

23. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; the mixer deflector (120) comprises the connection tip (130) to which the big deflector (122) part is connected.

24. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; the mixer deflector (120) comprises the connection body (123) to which the small deflector (121) part is connected.

25. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; the distance from the short edge endpoint of the inclined edge at the tips of the upward disintegrator teeth (111) and the downward disintegrator teeth (112) to the centre (M) is equal to the radius of the disintegrator and disperser impeller (A) and the distance from the long edge endpoint of the inclined edge at the tips of the upward disintegrator teeth (111) and the downward disintegrator teeth (112) to the centre (M) is equal to the cutting radius of the disintegrator tooth (C).

26. A disintegrator and disperser impeller (100) for disintegration, homogeneous dispersion and dissolution of particles added into the fluid at atmospheric pressure according to Claim 1, wherein; the inclined edge at the tips of the upward disintegrator teeth (111) and downward disintegrator teeth (112) is the line connecting the endpoint of the short edge whose distance from the centre (M) is equal to the radius of the disintegrator and disperser impeller (A) and the endpoint of the long edge whose distance from the centre (M) is equal to the cutting radius of the disintegrator tooth (C).

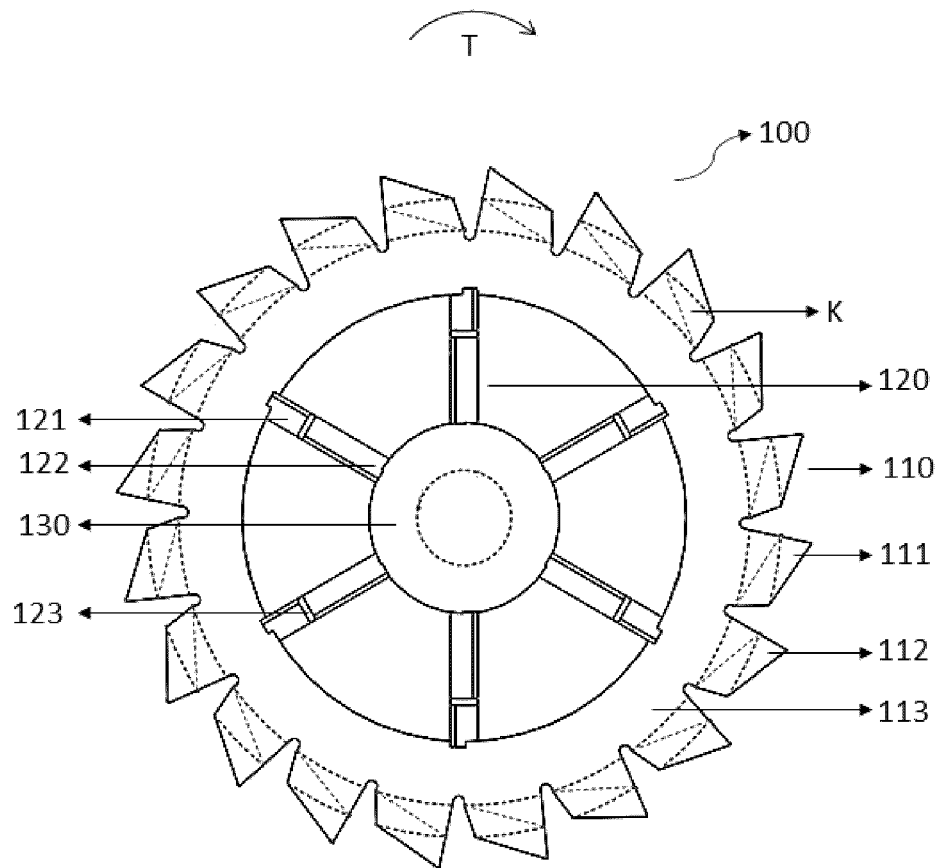


Figure – 1

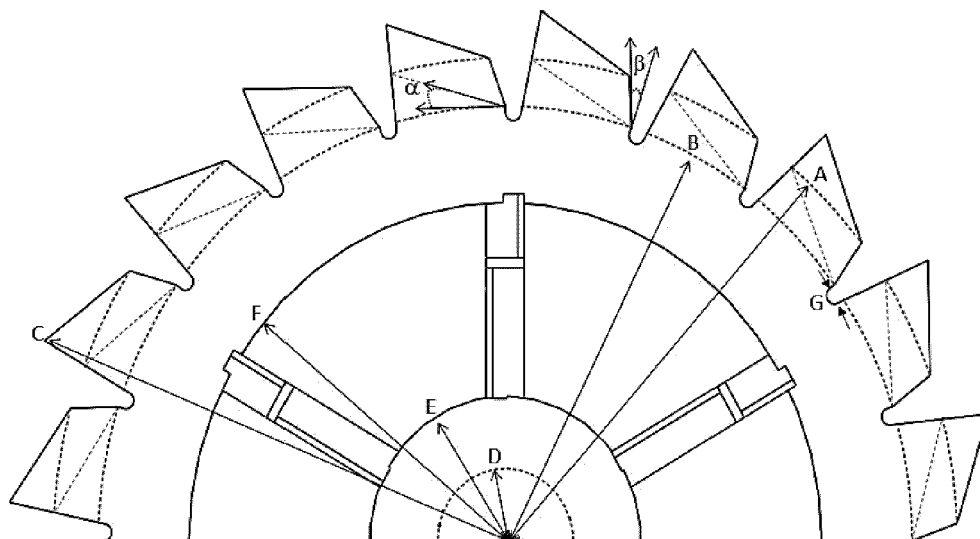


Figure – 2

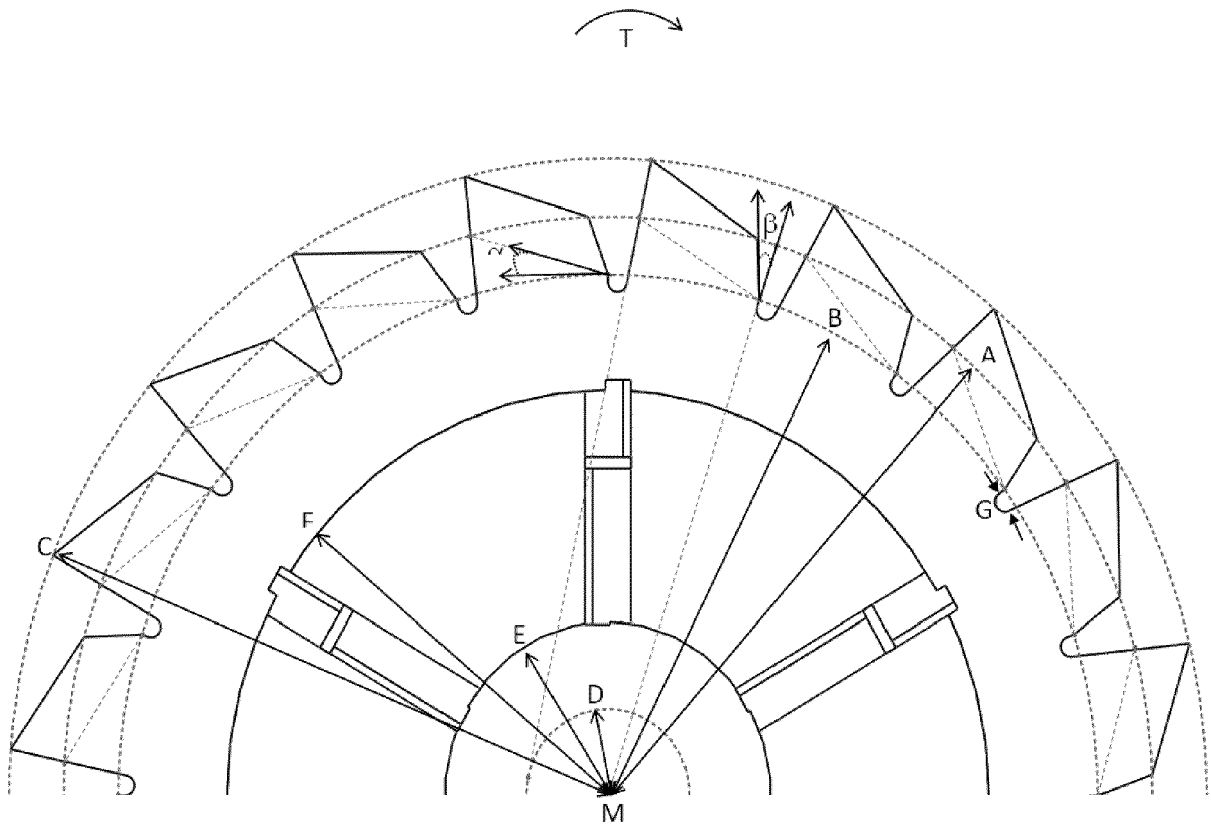


Figure - 3

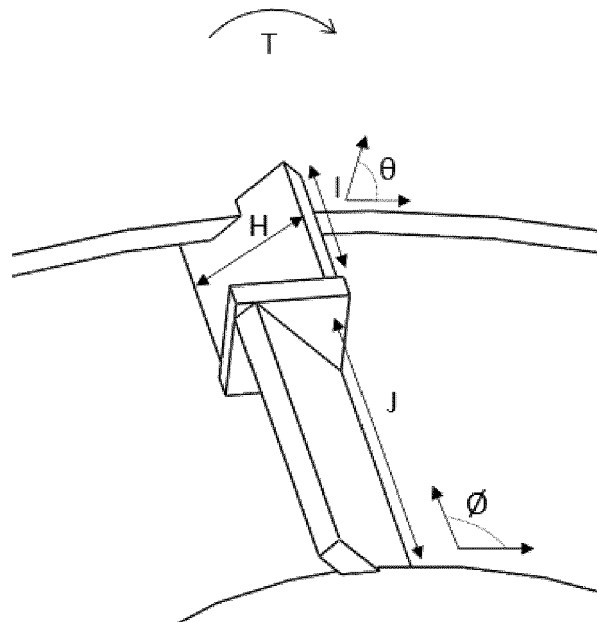


Figure - 4

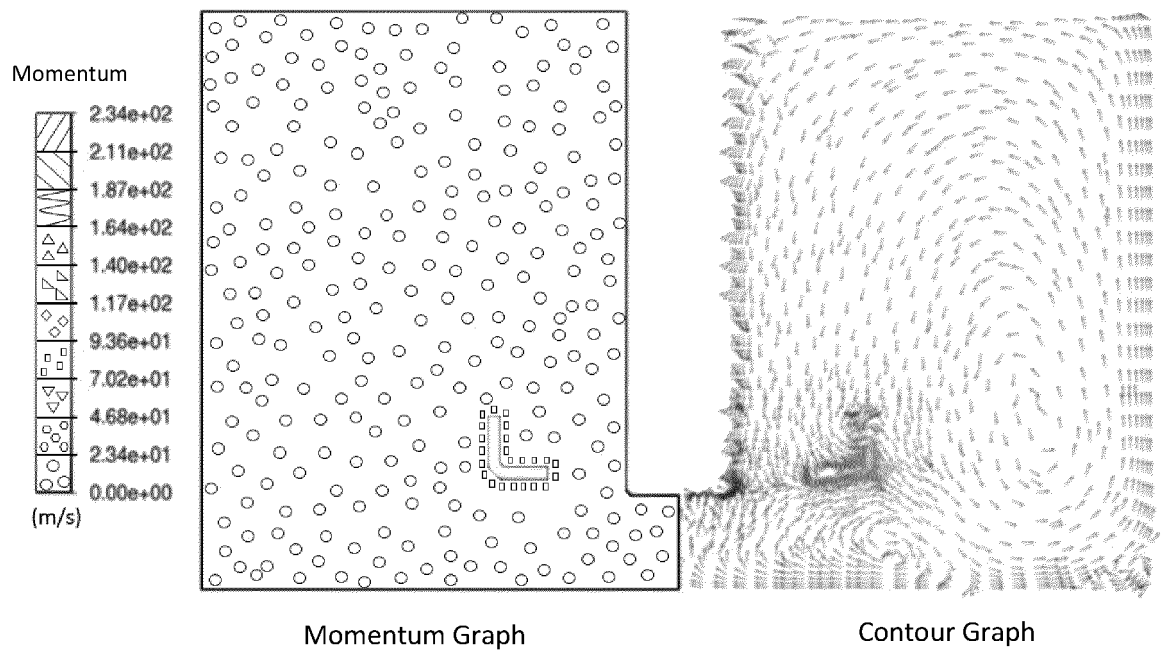


Figure – 5



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Application Number

EP 23 16 9444

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EPO FORM 1503 03.82 (P04C01)

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CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

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