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Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) **A fluid-agitating tank assembly for a machine for filling containers and an agitator for such tank assembly**

(57) A fluid-agitating tank assembly (1) comprising: a tank (10) filled in use with a fluid, in particular a fluid with particles, and having a top portion (13) and a bottom portion (14); and an agitator (11) housed in the tank (10) so as to be immersed in use in the fluid and supported by the tank (10) in a rotatable manner about an axis (D); the agitator (11) comprises moving means (25) acting in use on the fluid for converting unidirectional rotation of the agitator (11) about the axis (D) into bi-directional movement of the fluid in the tank (10) towards the top and bottom portions (13, 14).

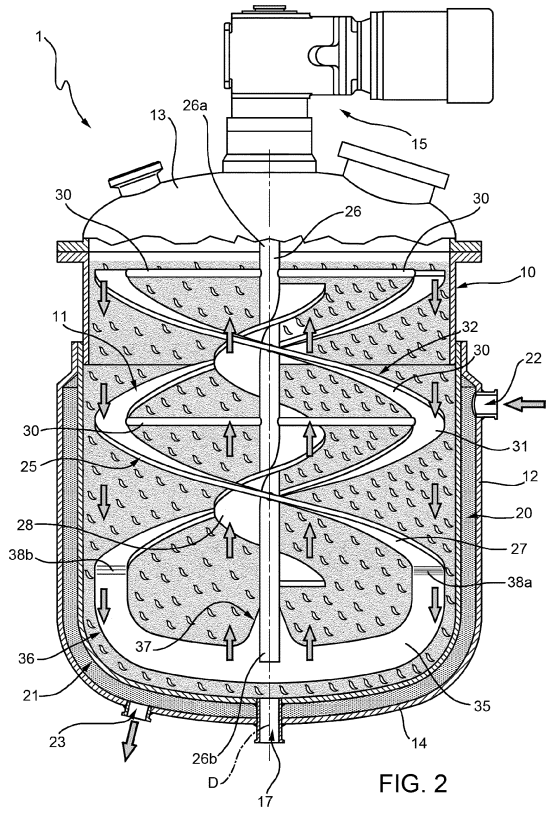

FIG. 2

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Description

TECHNICAL FIELD

[0001] The present invention relates to a fluid-agitating tank assembly for a machine for filling containers.

[0002] The present invention also relates to an agitator for moving a fluid in a tank.

[0003] The present invention may be used to particular advantage for fluids with particles, such as soft drinks or beverages with fruit particles, which the following description will refer to, although this is in no way intended to limit the scope of protection as defined by the accompanying claims.

BACKGROUND ART

[0004] As known, there is an increasing demand from the market for soft drinks or beverages containing fruit particles or pieces, such as soft fruit bits, normally available in cubes or slices, fruit fibers, containing large portions of fruit cellulose, and fruit sacs, i.e. intact "pouch-like" structures of a citrus fruit, filled with or without liquid and having lengths up to 5-8 mm.

[0005] These kinds of beverages are normally stored in tanks before being delivered to the filling machines and then closed and sealed into containers or bottles for retail.

[0006] In many cases, these beverages have to be delivered to the containers in a hot state and therefore they have to be heated when they are stored in the tanks. Moreover, they have to be continuously moved by an agitator housed in the tank in order to avoid that the fruit particles float on the free surface of the beverage or sink to the bottom of the tank.

[0007] Conventionally agitators are typically formed by a shaft immersed in the tank, rotatable about its axis and provided with two or more blades acting on the whole beverage.

[0008] This kind of agitator tends to damage the fruit particles, in particular when these particles are sacs. The damaging action on the fruit particles is further aggravated when the action of the blades of the agitator is combined with heating the beverage in the tank.

[0009] Moreover, it is normally requested that the fruit particles are kept in suspension in the fluid before being delivered to the containers; the standard agitators may be suitable for particles naturally floating or sinking but not for both of them.

DISCLOSURE OF INVENTION

[0010] It is an object of the present invention to provide a fluid-agitating tank assembly for a machine for filling containers, designed to eliminate the aforementioned drawbacks, and which is capable of performing a gentle mixing action on the fluid without damaging possible particles contained therein.

[0011] It is another object of the present invention to provide a fluid-agitating tank assembly for a machine for filling containers, which keeps particles in suspension in the fluid, irrespective of whether such particles naturally tend to float or sink.

[0012] According to the present invention, there is provided a fluid-agitating tank assembly for a machine for filling containers, as claimed in claim 1.

[0013] The present invention also relates to an agitator for moving a fluid in a tank, as claimed in claim 17.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic top plan view, with parts removed for clarity, of a filling machine fed with a fluid coming from a tank assembly according to the present invention;

Figure 2 shows a larger-scale, partly sectioned front view of the Figure 1 tank assembly;

Figure 3 shows a larger-scale view in perspective of an agitator of the Figure 2 tank assembly;

Figure 4 shows a front view of the Figure 3 agitator; and

Figure 5 shows a side view of the Figure 3 agitator.

BEST MODE FOR CARRYING OUT THE INVENTION

[0015] Number 1 in Figures 1 and 2 indicates as a whole a fluid-agitating tank assembly for a machine 2 (Figure 1) for filling containers (known per se and not shown).

[0016] As used therein, the term "fluid" relates to any pourable product having at least a liquid fraction.

[0017] The present invention is used to particular advantage for fluids with particles, i.e. fluids having not only a liquid fraction but also solid parts (the particles) immersed therein, as the fluid shown in Figure 2; typical examples are soft drinks or beverages containing fruit particles, such as soft fruit bits, fruit fibers and fruit sacs.

[0018] The term "fluid" may also encompass a pourable product formed by two or more miscible liquids, which have to be continuously agitated for improving their mixing.

[0019] Tank assembly 1 is used to store and agitate a fluid with particles destined to be fed to machine 2 and to fill a plurality of containers handled by such machine.

[0020] In particular, machine 2 is of known type and basically comprises a carousel 3, mounted to rotate continuously (anticlockwise in Figure 1) about a vertical axis A perpendicular to the Figure 1 plane. The carousel 3 receives a succession of empty containers from an input star wheel 4, which is connected to carousel 3 at a first transfer station 5 and is mounted to rotate continuously about a respective longitudinal axis B parallel to axis A.

The carousel 3 releases a succession of filled containers to an output star wheel 6, which is connected to carousel 3 at a second transfer station 7 and is mounted to rotate continuously about a respective longitudinal axis C parallel to axes A and B.

[0021] Machine 2 further comprises a plurality of filling units 8, which are equally spaced angularly about axis A, are mounted along a peripheral portion of carousel 3, and are moved by the carousel 3 along a path P extending about axis A and through stations 5 and 7.

[0022] The fluid is delivered in a known manner from tank assembly 1 to machine 2 through a fluid delivering circuit 9, only partially shown in Figure 1.

[0023] With reference to Figures 1 and 2, tank assembly 1 basically comprises a tank 10 filled in use with the above-mentioned fluid with particles and having an axis D parallel to axes A, B and C, and an agitator 11 coaxially housed in the tank 10 so as to be immersed in use in the fluid and supported by the tank 10 in a rotatable manner about axis D.

[0024] As visible in Figure 2, tank 10 has a substantially cylindrical lateral wall 12 of axis D and is closed, at its opposite axial ends, by a top wall 13 and a bottom wall 14.

[0025] In particular, top wall 13 externally supports a motor assembly 15 for moving agitator 11 about axis D, whilst bottom wall 14 is provided with a mouth 17 of axis D, which can be selectively connected to a fluid feeding circuit (known per se and not shown) or to fluid delivering circuit 9 for delivering the fluid to the machine 2.

[0026] In the preferred embodiment shown in the present application, both top and bottom walls 13, 14 have dome-shaped or slightly rounded-shaped configurations.

[0027] As visible in Figure 2, a heating apparatus 20 is incorporated in the tank 10 for heating the fluid contained therein.

[0028] In particular, heating apparatus 20 comprises a cavity 21 formed in lateral and bottom walls 12, 14, an inlet 22 for feeding a heating medium to the cavity 21 and an outlet 23 for draining the heating medium from the cavity 21; in practice, inlet 22 and outlet 23 are both connected to a circuit (known per and not shown) for circulating continuously the heating medium through the cavity 21 and allowing a heat exchange with the fluid contained in the tank 10.

[0029] In the solution disclosed in Figure 2, inlet 22 is formed in lateral wall 12 in a position adjacent to top wall 13, whilst outlet 23 is formed in bottom wall 14 on one side of mouth 17.

[0030] With reference to figures 2 to 5, agitator 11 comprises moving means 25 acting in use on the fluid contained in the tank 10 for converting unidirectional rotation of the agitator 11 about axis D into bi-directional movement of the fluid in the tank 10 towards top and bottom walls 13, 14.

[0031] In particular, agitator 11 comprises a central shaft 26 of axis D, from which moving means 25 transversely project cantilevered.

[0032] Shaft 26 and therefore the entire agitator 11 project cantilevered in the tank 10 from top wall 13; more specifically, the shaft 26 has a first end 26a supported by top wall 13 and a second end 26b facing bottom wall 14.

[0033] Moving means 25 comprise at least a first helical element 27 and a second helical element 28, carried by shaft 26 and counter-posed to one another for imparting the fluid opposite movements towards top and bottom walls 13, 14 of tank 10.

[0034] In other words, helical elements 27, 28 are wound round axis D in opposite directions by considering a given advancing direction along the axis D.

[0035] In the example shown in Figure 2, helical element 27 is left-handed and produces in use a substantially axial fluid flow directed towards bottom wall 14 when the agitator 11 is turned clockwise about axis D; in a completely different manner, helical element 28 is left-handed and produces in use a substantially axial fluid flow directed towards top wall 13 when the agitator 11 is turned clockwise about axis D; it is however clear that helical element 27 may be also right-handed and helical element 28 may be left-handed with opposite actions on the fluid as a result of the same direction of rotation of the agitator 11 about axis D.

[0036] In the example shown, helical element 27 has a radius larger than the radius of helical element 28 with respect to axis D; in practice, helical element 28 is arranged inside helical element 27.

[0037] In greater detail, helical element 28 is directly wound on shaft 26, whilst helical element 27 is maintained spaced from the shaft 26 by a plurality of arms 30 radially protruding from the shaft 26.

[0038] According to a preferred embodiment of the present invention, moving means 25 comprise a further helical element 31 wound round axis D in the same direction as helical element 27 by considering a given advancing direction along the same axis, congruent with the helical element 27 and angularly spaced from the latter about the axis D.

[0039] Helical elements 27 and 31 have the same radius with respect to axis D and are preferably angularly spaced about axis D of an angle of 180°.

[0040] In practice, helical elements 27 and 31 define one double helix 32.

[0041] As shown in Figure 2, double helix 32 and helical element 28 are configured so as to move in use the fluid in the tank 10 in opposite directions substantially parallel to axis D upon rotation of the shaft 26 in a given direction of rotation (clockwise in Figure 2).

[0042] Helical elements 27 and 31 perfectly suit the tank shape in order to optimize the heat exchange between the heating apparatus 20 and the fluid. In particular, helical elements 27 and 31 are arranged at a maximum distance of 1 cm from lateral and bottom walls 12, 14.

[0043] In the example shown, each helical element 27, 28, 31 is defined by a flat metal band bent to take the

helical configuration.

[0044] With reference to Figures 2 to 5, moving means 25 further comprise an anchor-like plate element 35 carried transversally by end 26b of shaft 26 and acting on the bottom of tank 10 to avoid formation of deposits and vortices when the fluid is delivered through mouth 17.

[0045] In particular, plate element 35 protrudes from diametrically opposite sides of end 26b of shaft 26 and extends along a diametral plane of the shaft 26.

[0046] Plate element 35 is delimited by an outer U-shaped profile 36 and has a tapering configuration towards its free axial end facing bottom wall 14 of tank 10.

[0047] In the example shown, plate element 35 has a U-shaped configuration defining a cavity 37 for receiving end 26b of shaft 26 and two opposite ends 38a, 38b integrally connected to helical elements 27, 31, respectively.

[0048] As visible in Figure 2, plate element 35 extends over mouth 17 and crosswise thereto so as to divide the fluid flow exiting from the tank 10; thanks to this configuration, plate element 35 acts as an anti-vortex rotatable about axis D together with agitator 11.

[0049] In use, continuous rotation of agitator 11 in a given direction (clockwise in Figure 2) produces, through the action of helical elements 27, 28, 31 a bidirectional movement of the fluid and the particles substantially parallel to axis D and towards top and bottom walls 13, 14 of the tank 10.

[0050] In the example shown, helical elements 27, 31 impart a descendant axial movement towards bottom wall 14 to the fluid and particles in the peripheral region of the tank 10, whilst helical element 28 imparts an ascendant axial movement towards top wall 13 to the fluid and particles in the central region of the tank 10.

[0051] In this way, the particles contained in the fluid are forced to move downwards and upwards, so creating a continuous circulation in the tank 10. The movements keep the particles in suspension in the fluid irrespective of the natural tendency of such particles to float or sink.

[0052] The anchor-like configuration of the plate element 35 keeps the bottom part of the tank 10 free from deposits and acts as an anti-vortex device on mouth 17 when the fluid is delivered to machine 2.

[0053] The advantages of tank assembly 1 and agitator 11 according to the present invention will be clear from the foregoing description.

[0054] In particular, the Applicant has observed that the action of helical-shaped elements 27, 28, 31 on the fruit particles is very gentle, so avoiding any possible risk of producing damages, in particular to fruit particles constituted by sacs.

[0055] Moreover, due to the fact that moving means 25 comprise at least two counter-posed helical elements 27, 28, 31, it is possible to obtain a mixing action suitable for both floating or sinking particles.

[0056] Thanks to the arrangement of helical elements 27, 31 very close to the lateral and bottom walls 12, 14, where the heating apparatus 20 is placed, a very good heat exchange action with the fluid can be achieved.

[0057] The combination of helical elements 27, 28, 31 with the anchor-like plate element 35 allows a good mixing action in the fluid contained in the tank 10 and absence of deposits at the bottom thereof.

[0058] Moreover, as already mentioned, plate element 35 also operates as a movable anti-vortex device in the mouth 17.

[0059] Clearly, changes may be made to machine 1 and the filling method as described and illustrated herein without, however, departing from the scope as defined in the accompanying claims.

Claims

1. A fluid-agitating tank assembly (1) for a machine (2) for filling containers, said tank assembly (1) comprising:

   - a tank (10) filled in use with a fluid, in particular a fluid with particles, and having a top portion (13) and a bottom portion (14); and
   - an agitator (11) housed in said tank (10) so as to be immersed in use in said fluid and supported by said tank (10) in a rotatable manner about an axis (D);

   characterized in that said agitator (11) comprises moving means (25) acting in use on said fluid for converting unidirectional rotation of said agitator (11) about said axis (D) into bi-directional movement of said fluid in said tank (10) towards said top and bottom portions (13, 14).

2. The tank assembly as claimed in claim 1, wherein said agitator (11) comprises a central shaft (26) coaxial with said axis (D), and wherein said moving means (25) comprise at least a first helical element (27, 31) and a second helical element (28), carried by said shaft (26) and counter-posed to one another for imparting said fluid opposite movements towards said top and bottom portions (13, 14) of said tank (10).

3. The tank assembly as claimed in claim 2, wherein said first and second helical element (27, 31; 28) are wound round said axis (D) in opposite directions by considering a given advancing direction along the same axis (D).

4. The tank assembly as claimed in claim 2 or 3, wherein said first helical element (27, 31) has a radius larger than the radius of said second helical element (28) with respect to said axis (D).

5. The tank assembly as claimed in any one of claims 2 to 4, wherein said second helical element (28) is

arranged inside said first helical element (27, 31).

6. The tank assembly as claimed in any one of claims 2 to 5, wherein said second helical element (28) is wound on said shaft (26), and wherein said first helical element (27, 31) is maintained spaced from said shaft (26) by a plurality of arms (30) radially protruding from the shaft (26).

7. The tank assembly as claimed in any one of claims 2 to 6, wherein said first and second helical element (27, 31; 28) are configured so as to move in use said fluid in opposite directions substantially parallel to said axis (D) upon rotation of said shaft (26) in a given direction of rotation.

8. The tank assembly as claimed in any one of claims 2 to 7, wherein said shaft (26) has a first end (26a) supported by said top portion (13) of said tank (10) and a second end (26b) facing said bottom portion (14) of said tank (10), and wherein said moving means (25) further comprise a plate element (35) carried transversally by said second end (26b) of said shaft (26) and acting on the bottom of said tank (10) to avoid formation of deposits.

9. The tank assembly as claimed in claim 8, wherein said plate element (35) protrudes from diametrically opposite sides of said second end (26b) of said shaft (26) and extend along a diametral plane of said shaft (26).

10. The tank assembly as claimed in claim 8 or 9, wherein said plate element (35) is delimited by an outer U-shaped profile (36) and has a tapering configuration towards its free axial end.

11. The tank assembly as claimed in any one of claims 7 to 9, wherein said plate element (35) has a U-shaped configuration.

12. The tank assembly as claimed in any one of claims 2 to 10, wherein said moving means (25) further comprise a third helical element (31) wound round said axis (D) in the same direction as said first helical element (27) by considering a given advancing direction along the same axis (D), angularly spaced from said first helical element (27) about said axis (D) and having the same radius as said first helical element (27).

13. The tank assembly as claimed in claim 12, wherein said first and third helical element (27, 31) are angularly spaced about said axis (D) of an angle of 180°.

14. The tank assembly as claimed in any one of claims 12 or 13, wherein said plate element (35) receives said second end (26b) of said shaft (26) into its cavity (37) and has opposite ends (38a, 38b) integrally connected to said first and said third helical element (27, 31), respectively.

15. The tank assembly as claimed in any one of claims 8 to 14, wherein said bottom portion (14) of said tank (10) comprises at least one outlet (17) for delivering said fluid to said machine (2), and wherein said plate element (35) extends over said outlet (17) and crosswise thereto so as to act as an anti-vortex device.

16. The tank assembly as claimed in any one of the foregoing claims, wherein said tank (10) is delimited by a wall (12, 14) incorporating heating means (20) for heating said fluid.

17. An agitator (11) for moving a fluid in a tank (10), said agitator (11) comprising:

- a shaft (26) mounted to rotate about its axis (D); and
- moving means (25) carried by said shaft (26) and adapted to act in use on said fluid to agitate it;

characterized in that said moving means (25) comprise at least a first helical element (27, 31) and a second helical element (28), carried by said shaft (26) and counter-posed to one another for imparting in use to said fluid opposite movements substantially parallel to said axis (D).

18. The agitator as claimed in claim 17, wherein said first and second helical element (27, 31; 28) are wound round said axis (D) in opposite directions by considering a given advancing direction along the same axis (D).

19. The agitator as claimed in claim 17 or 18, wherein said first helical element (27, 31) has a radius larger than the radius of said second helical element (28) with respect to said axis (D).

20. The agitator as claimed in any one of claims 17 to 19, wherein said second helical element (28) is arranged inside said first helical element (27, 31).

21. The agitator as claimed in any one of claims 17 to 20, wherein said second helical element (28) is wound on said shaft (26), and wherein said first helical element (27, 31) is maintained spaced from said shaft (26) by a plurality of arms (30) radially protruding from the shaft (26).

22. The agitator as claimed in any one of claims 17 to 21, wherein said shaft (26) has a first end (26a) for receiving a rotational drive and a second free end

(26b), and wherein said moving means (25) further comprise a plate element (35) carried transversally by said second end (26b) of said shaft (26).

23. The agitator as claimed in claim 21, wherein said plate element (35) protrudes from diametrically opposite sides of said second end (26b) of said shaft (26) and extend along a diametral plane of said shaft (26).

24. The agitator as claimed in claim 22 or 23, wherein said plate element (35) is delimited by an outer U-shaped profile (36) and has a tapering configuration towards its free axial end.

25. The agitator as claimed in any one of claims 22 to 24, wherein said plate element (35) has a U-shaped configuration.

26. The agitator as claimed in anyone of claims 17 to 25, wherein said moving means (25) further comprise a third helical element (31) wound round said axis (D) in the same direction as said first helical element (27) by considering a given advancing direction along the same axis (D), angularly spaced from said first helical element (27) about said axis (D) and having the same radius as said first helical element (27).

27. The agitator as claimed in claim 26, wherein said first and third helical element (27, 31) are angularly spaced about said axis (D) of an angle of 180°.

28. The agitator as claimed in any one of claims 26 or 27, wherein said plate element (35) receives said second end (26b) of said shaft (26) into its cavity (37) and has opposite ends (38a, 38b) integrally connected to said first and said third helical element (27, 31), respectively.

Amended claims in accordance with Rule 137(2) EPC.

1. A fluid-agitating tank assembly (1) for a machine (2) for filling containers, said tank assembly (1) comprising:

- a tank (10) filled in use with a fluid with particles and having a top portion (13) and a bottom portion (14) in turn comprising at least one outlet (17) for delivering said fluid to said machine (2); and
- an agitator (11) housed in said tank (10) so as to be immersed in use in said fluid and supported by said tank (10) in a rotatable manner about an axis (D);

wherein said agitator (11) comprises:

- a central shaft (26) coaxial with said axis (D) and having a first end (26a) supported by said top portion (13) of said tank (10); and
- moving means (25) acting in use on said fluid for converting unidirectional rotation of said agitator (11) about said axis (D) into bi-directional movement of said fluid in said tank (10) towards said top and bottom portions (13, 14); said moving means (25) comprising at least a first helical element (27, 31) and a second helical element (28), carried by said shaft (26) and counterposed to one another for imparting said fluid opposite movements towards said top and bottom portions (13, 14) of said tank (10);

characterized in that said shaft (26) has a second end (26b) facing said bottom portion (14) of said tank (10);

in that said moving means (25) further comprise a plate element (35) acting on the bottom of said tank (10), carried transversally by said second end (26b) of said shaft (26), extending over said outlet (17) and crosswise thereto so as to act as an anti-vortex device and to avoid formation of deposits; and

in that said plate element (35) protrudes from diametrically opposite sides of said second end (26b) of said shaft (26), extends along a diametral plane of said shaft (26), is delimited by an outer U-shaped profile (36) and has a tapering configuration towards its free axial end.

2. The tank assembly as claimed in claim 1, wherein said first and second helical element (27, 31; 28) are wound round said axis (D) in opposite directions by considering a given advancing direction along the same axis (D).

3. The tank assembly as claimed in claim 1 or 2, wherein said first helical element (27, 31) has a radius larger than the radius of said second helical element (28) with respect to said axis (D).

4. The tank assembly as claimed in any one of the foregoing claims, wherein said second helical element (28) is arranged inside said first helical element (27, 31).

5. The tank assembly as claimed in any one of the foregoing claims, wherein said second helical element (28) is wound on said shaft (26), and wherein said first helical element (27, 31) is maintained spaced from said shaft (26) by a plurality of arms (30) radially protruding from the shaft (26).

6. The tank assembly as claimed in any one of the foregoing claims, wherein said first and second helical element (27, 31; 28) are configured so as to move in use said fluid in opposite directions substantially

parallel to said axis (D) upon rotation of said shaft (26) in a given direction of rotation.

7. The tank assembly as claimed in any one of the foregoing claims, wherein said plate element (35) has a U-shaped configuration.

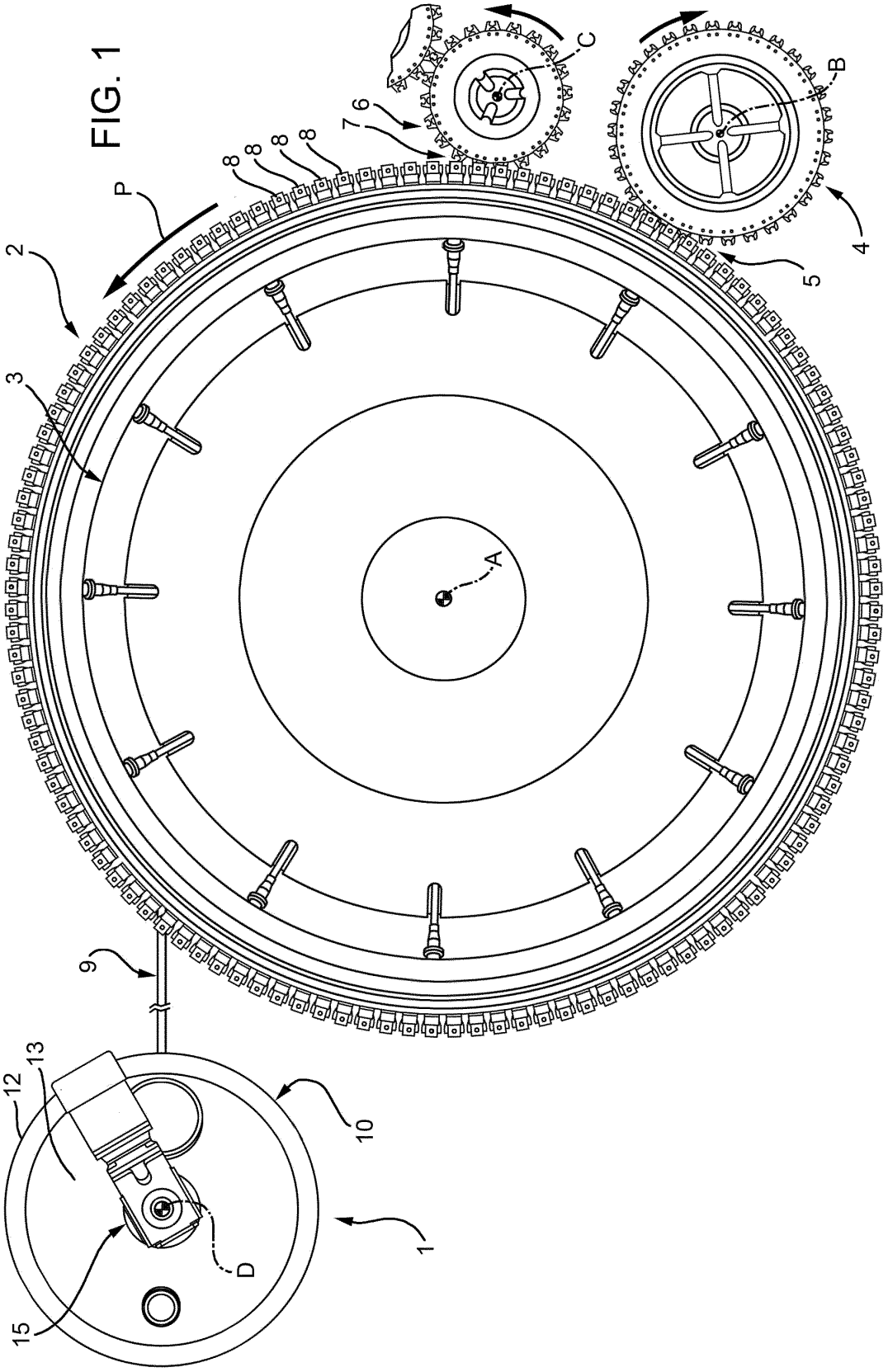
8. The tank assembly as claimed in any one of the foregoing claims, wherein said moving means (25) further comprise a third helical element (31) wound round said axis (D) in the same direction as said first helical element (27) by considering a given advancing direction along the same axis (D), angularly spaced from said first helical element (27) about said axis (D) and having the same radius as said first helical element (27).

9. The tank assembly as claimed in claim 8, wherein said first and third helical element (27, 31) are angularly spaced about said axis (D) of an angle of 180°.

10. The tank assembly as claimed in claim 8 or 9, wherein said plate element (35) receives said second end (26b) of said shaft (26) into its cavity (37) and has opposite ends (38a, 38b) integrally connected to said first and said third helical element (27, 31), respectively.

11. The tank assembly as claimed in any one of the foregoing claims, wherein said tank (10) is delimited by a wall (12, 14) incorporating heating means (20) for heating said fluid.

FIG. 1



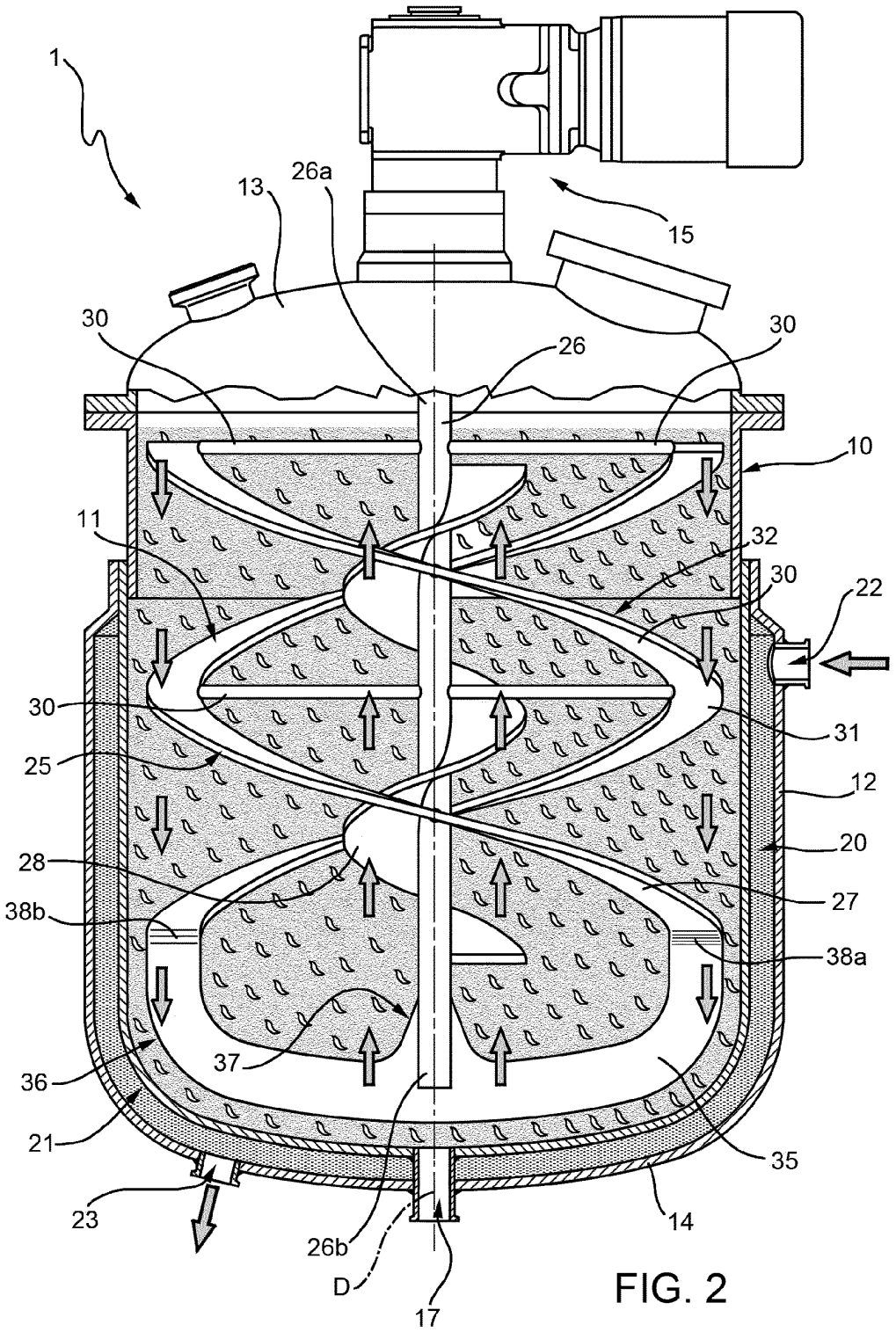

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FIG. 2

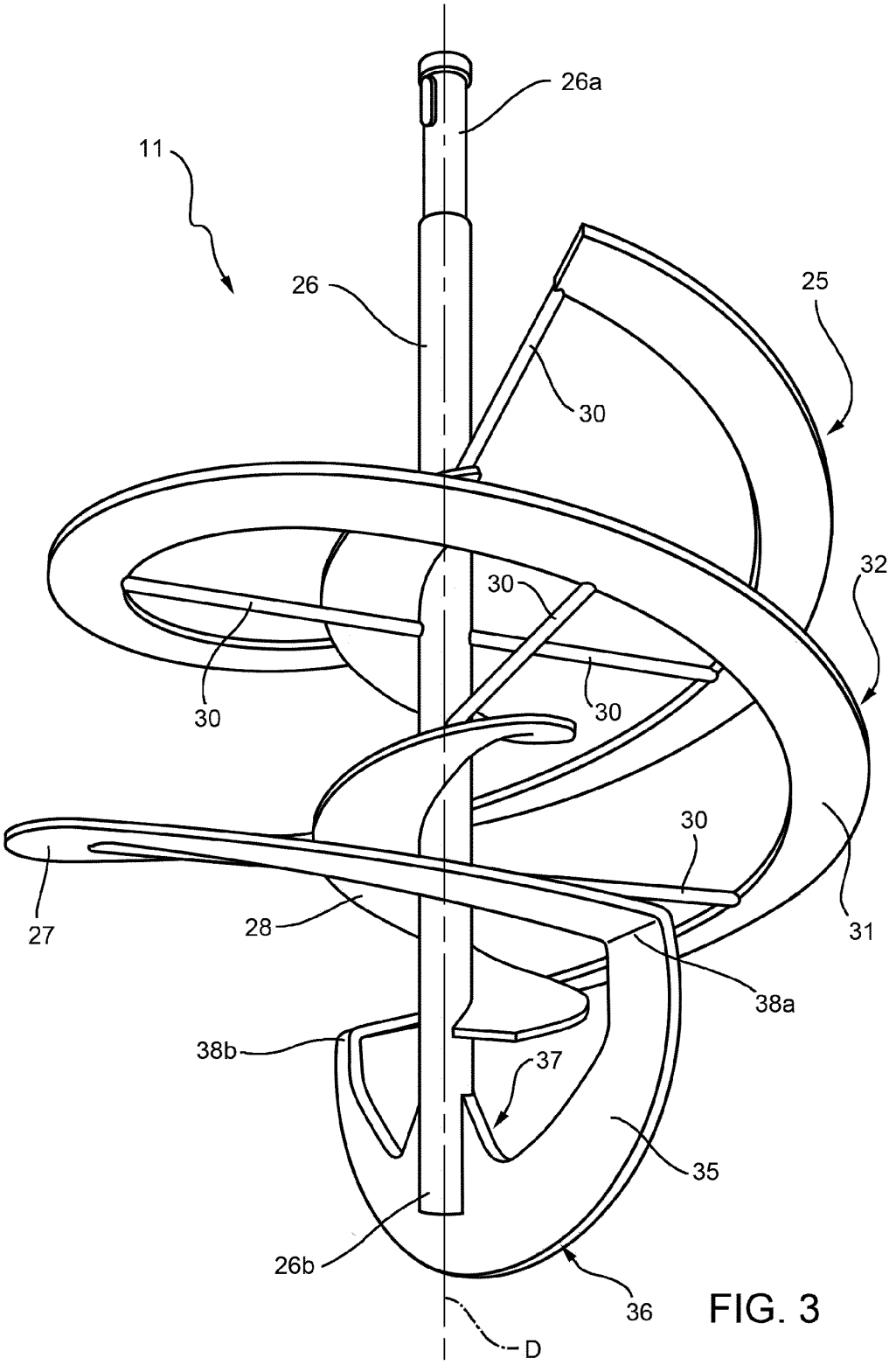

FIG. 3

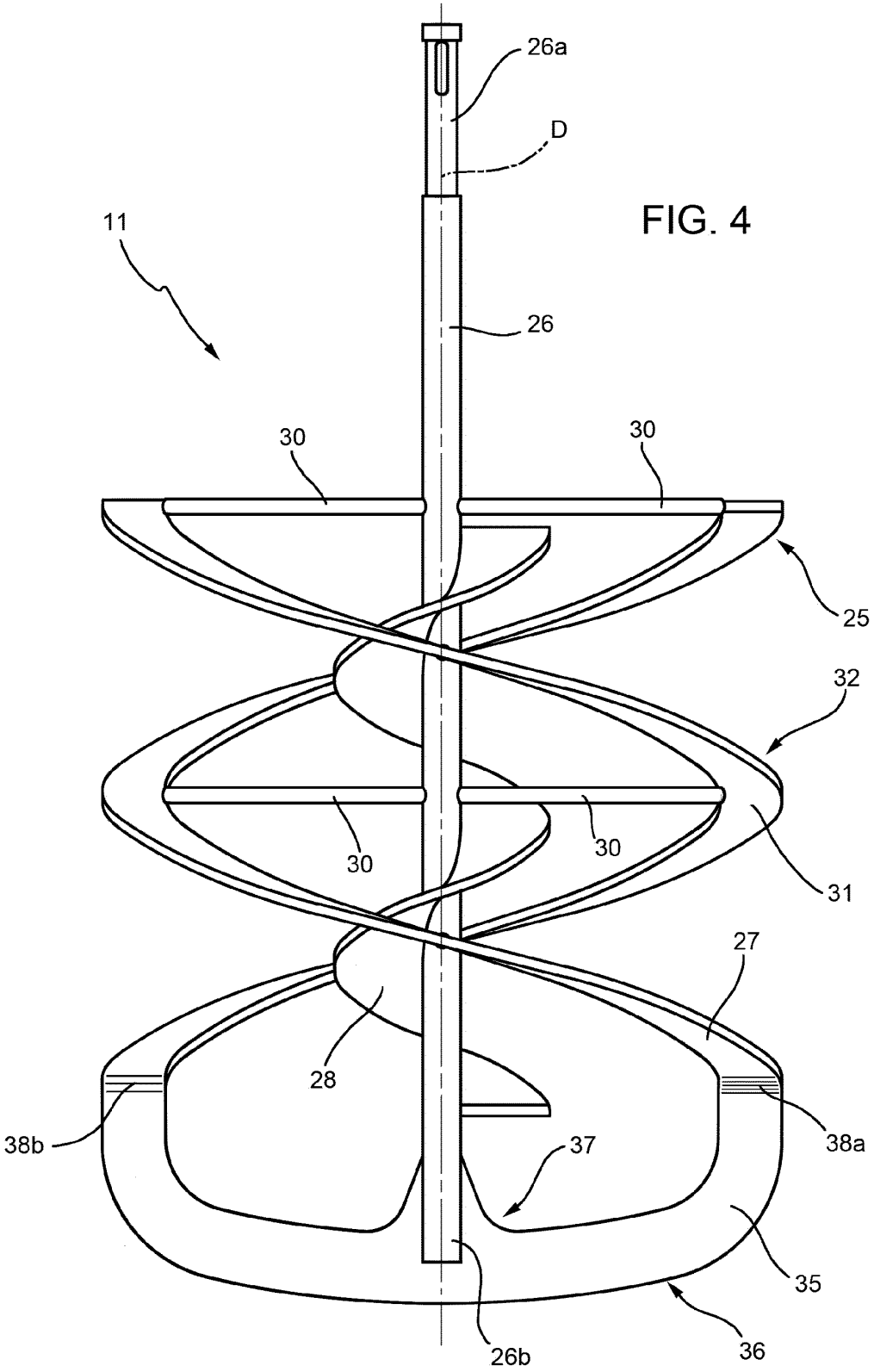

FIG. 4

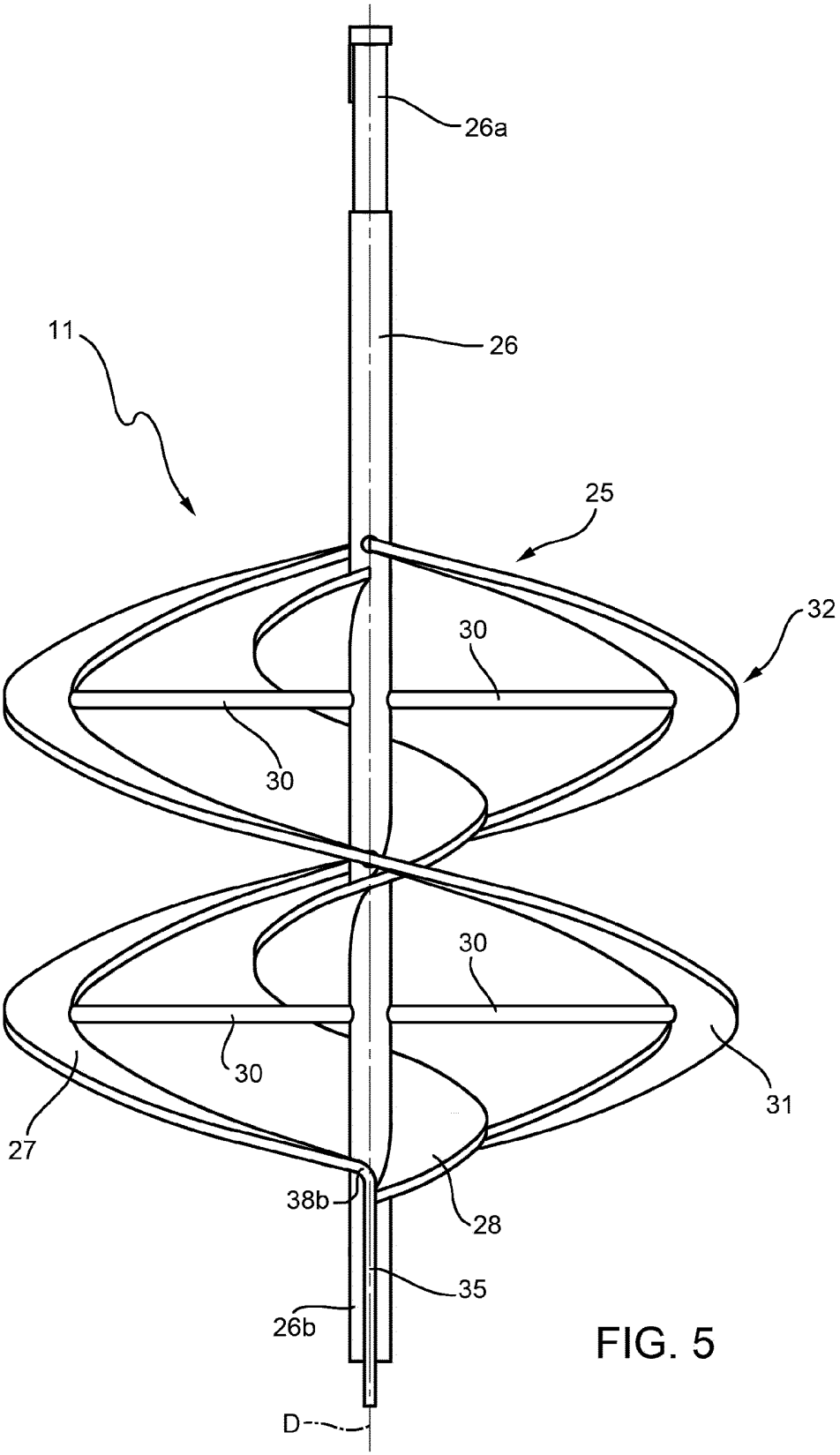

FIG. 5

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 13 16 0250

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 509 987 A (WILCOX) 5 December 1893 (1893-12-05) * figure 1 * * page 1, line 9 - page 2, line 5 *	1-5,7, 16-20	INV. B01F7/00 B01F7/24 B01F15/06
X	JP S55 70332 A (JAPAN SYNTHETIC RUBBER CO LTD) 27 May 1980 (1980-05-27) * figure 2c *	1-5,7, 17-20	
X	US 3 482 823 A (RECHTIN CLARENCE R) 9 December 1969 (1969-12-09) * figure 9 * * column 4, line 71 - column 5, line 8 *	1-5,7, 17-20	
X	EP 0 398 788 A1 (ATOCHEM ELF SA [FR]) 22 November 1990 (1990-11-22) * figure 1 * * page 4, line 5 - line 8 *	1-7, 16-21	
X	EP 1 114 672 A2 (HARTMANN JOERG [CH]) 11 July 2001 (2001-07-11) * figures 1,2 * * paragraph [0014] - paragraph [0019] *	1-7, 16-21	TECHNICAL FIELDS SEARCHED (IPC) B01F
X	CA 2 731 629 A1 (ZERO WASTE ENERGY SYSTEMS INC [CA]) 11 August 2012 (2012-08-11) * figures 2,3 * * page 1 - page 2 *	17-20	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	15 October 2013	Krasenbrink, B

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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EUROPEAN SEARCH REPORT

Application Number
EP 13 16 0250

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* figures 20,21 * * column 11, line 36 - column 12, line 15 *	6,21	
X	NL 125 092 C (SAINT-GOBAIN) 16 September 1968 (1968-09-16) * figure 1 * * column 3, line 76 - column 4, line 33 *	17-20, 22-28	
A	EP 0 598 253 A1 (SHINKO PANTEC CO LTD [JP]) 25 May 1994 (1994-05-25) * figures 5A,5B * * abstract *	8-15, 22-28	
A	EP 0 515 852 A1 (EKATO RUEHR MISCHTECHNIK [DE]) 2 December 1992 (1992-12-02) * figures 1,3 * * column 2, line 14 - line 22 *	8-15, 22-28	TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	15 October 2013	Krasenbrink, B

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Application Number
EP 13 16 0250

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 13 16 0250

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-7, 16-21

   Fluid-agitating tank assembly and agitator comprising the second helical element wound on the shaft and the first helical element maintained spaced from the shaft by a plurality of arms

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2. claims: 8-11, 15, 22-25

   Fluid-agitating tank assembly and agitator comprising a plate element at the second end of the shaft

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3. claims: 12-14, 26-28

   Fluid-agitating tank assembly and agitator comprising a third helical element

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 13 16 0250

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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15-10-2013

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