



(12) **EUROPEAN PATENT APPLICATION**

(21) Application number : **93500063.8**

(51) Int. Cl.⁵ : **B01F 1/00**

(22) Date of filing : **13.05.93**

(30) Priority : **14.05.92 ES 9201000**

(43) Date of publication of application :
24.11.93 Bulletin 93/47

(84) Designated Contracting States :
AT CH DE DK ES FR GB IT LI NL PT

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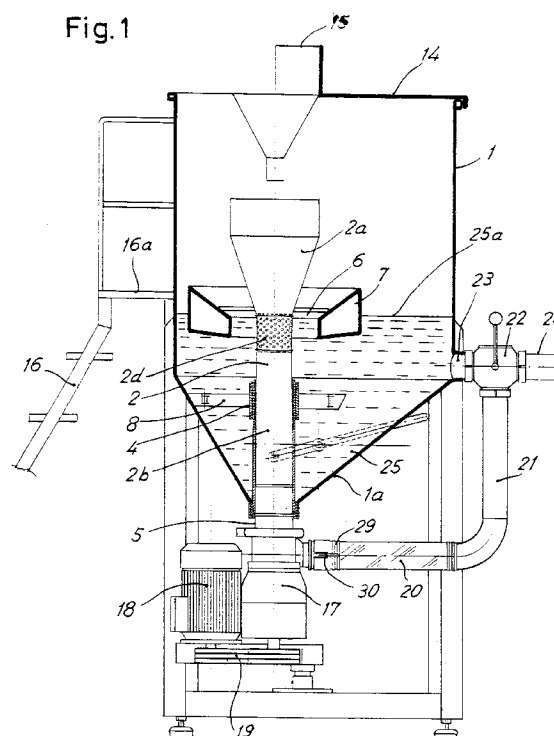
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(54) **Apparatus for dissolving or dispersing different powder ingredients and additives, in a liquid.**

(57) Apparatus for dissolving or dispersing powder products of different nature in a liquid

It comprise a tank (1) to store the liquid, a tubular element (2), uprightly oriented, ending at its top in a funnel-shaped pattern (2a), and with its other end arranged, slidably socketed, in telescopic assembly, within a stiff sleeve (3) guided in its upper part and with its lower end in abutment against a tank draining aperture. Radial arms (6) integral with the part (2a) are supported on a float (7) coaxial to the tubular element (2) and a sector (2d) of said element (2) bears passing holes (9) so that the pierced tubular wall is slightly emerging above the liquid level and a most of it is submerged. Extending in the interior of said tubular element (2) cross walls (10) avoid swirling and means (17), (18) are provided to develop a closed circuit fluid flow by a forced sucking of the liquid from the tank through the sector (2d) with holes, and to impel it through a return duct toward the said tank with a passageway through disgregation and/or dispersion means.

Fig.1



This invention relates to an apparatus for dissolving or dispersing powder products of different nature in a liquid, devised, namely, for preparing brine having high proteic rate and foaming capacity, although it can be used to prepare other products such as nutritional syrups or mixtures of different liquids in food, drink or chemical processing sectors.

One of the problems encountered when preparing dissolution of powder products with liquids, and namely for obtaining brine to be later on injected in meat products, the said brine including very varied fillers (salt, sugar, spices, preservatives, proteins, antioxidants, thickeners and gelling agents, etc.) is foam forming, said foam being highly stable, this meaning that very long periods of rest have to be foreseen for further use of the dissolution or dispersion obtained.

Up to now, know apparatus of the type to which the present invention relates may include a grinding unit, installed in a tank with liquid, the said ingredients and additives being poured thereto and whose processing requires a long period of time as much for homogenizing the mixture obtained as for eliminating the foam produced. Spanish utility model n° 210.909 refers to a device of this kind.

A second apparatus is based on developing a liquid closed circuit flow with outlet and arrival to the tank and intercalating a hopper for loading the product which is absorbed at one point of the circuit by e.g. a Venturi system, completed with a grinding or disgregating mill or which is broken down by the own sucking means inside the circuit.

The latter devices require complicated controlling means for an even absorption of the powder product added to the liquid and, bearing in mind its dissolution by swirling they do not prevent foam forming, a very long time being therefore required before using the dissolution or dispersion obtained in the event of injection brine of high proteic rate and foaming capacity, or chemical type anti-foam must be used.

In order to overcome above problems, the invention proposes an apparatus which embodies a forced feed system by axial flow, primarily laminar, to supply the product within the liquid, which prevents or significantly decreases the incorporation of air from the beginning of the preparation, minimizing the formation of foam and reducing the foam stability within the liquid, making unnecessary to incorporate chemical type anti-foam in the injection brine.

The said apparatus provides a total disgregation and dispersion of the injection brine components with a preparation time less than that of other prior known processes and known equipments.

Essentially, the disclosed apparatus includes following components:

- a) a tank to store the starting liquid with an inverted frustum conical lower section;
- b) a tubular element, uprightly oriented, ending at its top in a funnel-shaped pattern, and its other

end arranged, slidably socketed, in telescopic assembly, within a vertical stiff sleeve supported with its upper end supported and guided and by its lower end in abutment against a tank draining aperture;

c) radial arms integral with the beginning of the funnel-shaped section of above mentioned tubular element, whose arms are supported on a float coaxial to the said tube, allowing the relative displacement of the tubular element with respect to said stiff sleeve depending on the level of the liquid or mixture in the tank;

d) a sector of the said tubular element, close to the end where the funnel-shaped pattern begins, has its wall provided with a plurality of passing holes, of a preset diameter depending on the characteristics of the product to be handled, the length of the said sector being such that the pierced tubular wall is slightly emerging, at any moment, above the liquid level and a most of it is submerged.

e) several cross or radial walls, extending in the interior of said tubular element from the area where the sector with passing holes ends up to its directly opposite end;

f) a feeding hopper for loading the product to be dissolved or dispersed, associated to the mouthpiece of the said tank, in upright alignment with the mouthpiece of the funnel-shaped portion topping said tubular element;

g) means to develop a closed circuit fluid flow by a forced sucking of the liquid from the tank through the sector with holes of the said tubular element joined to the float, and to impel it toward the said tank with a passageway through disgregation and/or dispersion means;

h) a three-way valve to direct the liquid flowing through said disgregation and/or dispersion means inwardly or outwardly to the tank, selectively, allowing the tank emptying.

By the said arrangement of the mentioned elements, the product is directly poured, through an auxiliary hopper associated to the mouthpiece of the tank into the funnel-shaped area and such product contacts a limited liquid portion (only the portion contained at the top section of the tubular element, close to the beginning of the said funnel-shaped pattern) where a sucking of the liquid occurs through the whole profile, passing through the holes of the tubular element wall, inside of it, the product being thus added very evenly to the liquid, and already added to that liquid it goes down the tube, without swirling the said cross or radial walls cooperating to it, having direct access to disgregation or grinding means formed either by a mill capable to generate the sucking or impelling or a set of grinding mill and pump operatively coupled, the fluid being recycled toward the lower section of the tank.

The means to suck the liquid from the tank and to impel it back thereto, are advantageously formed by a grinding mill driven by an electric engine, the grinding-dispersing group embodying means to develop the mentioned sucking-impelling through the said mill shearing moving elements action, although it would be possible to use a centrifugal pump to develop the said liquid flow and to intercalate a grinding mill to the circuit in the sucking duct or in the impulsion duct.

Mentioned stiff sleeve is placed in abutment by its lower end against an annular joint lodged within a bushing on a draining aperture of the tank and is guided and centred in its upper part by a ring held by radial rods integral with the inner wall of the lower frustum-conical sector of the tank. The stiff sleeve is linked by bars to an horizontal transversal axis extending outside the tank by one of its ends and connected to a lever in order to raise the sleeve leaving its seat and allowing the emptying of the tank.

The side wall of the tubular element bears a annular rib acting as an abutment restricting its insertion within the sleeve.

The above and other objects, advantages and features of the present invention will become apparent from the following description of a preferred embodiment thereof.

The invention will now be described in detail with reference to the accompanying drawings wherein:

Fig. 1 is a side elevational view, with partial cross section of the whole apparatus disclosed.

Fig 2 is a top plan view of the tank without the tubular element and the lid.

Fig 3 is an enlarged cross-sectional view of part of the apparatus of Fig 1 showing the stiff sleeve which supports and guides the tubular element, coupled by its upper end to the centring and guiding ring and with its lower end abutting to an annular joint on a drainage aperture of the tank.

Fig. 4 is a detailed perspective enlarged view, at larger scale, of the sector with holes of the top of the tubular element, where the liquid sucking occurs with addition of the ingredients or additives to the said fluid.

Fig. 5, 6 and 7 show different tubular elements separately usable in this apparatus, with a different size of their funnel-shaped sector, and/or different lengths of its body or pierced tubular portion, for preparing different quantities of dissolution or dispersion, in a same tank.

Fig. 8 shows a graphic where the ratio brine/foam is compared against the time when finishing to form the dissolution or dispersion, using the apparatus of the invention, curve **p** or a conventional apparatus **q**. Fig. 1 shows the tank 1 for storing the starting liquid, with an inverted frustum-conical lower section 1a, the upright tubular element 2, with a funnel-shaped pattern 2a, at its top and with its lower portion 2b ar-

ranged slidably socketed in telescopic assembly within a stiff sleeve 3 supported and guided by one of its ends by a ring 4 held by radial rods 8 integral through brackets 27 welded to the inner wall of the frustum-conical lower section 1a of the tank 1, said stiff sleeve 3 resting by its other end in abutment against the entrance of a draining duct 5 at the lower part of said tank 1. The portion 2a has integral with it, radial arms 6 as support on a float 7 of trapezoidal cross section which keeps the tubular element 2 at a higher or lower height depending on the corresponding level 25a of the liquid 25 within the tank 1.

Fig. 4 shows in details a sector 2d of said tubular element 2 close to the funnel shaped end 2a, with its wall provided with a plurality of passing holes 9, of a preset diameter depending on the characteristics of the product to be treated, the length of the said sector being such, that, bearing in mind its relation to the float 7, the said tubular pierced wall 2d is, at any time, slightly above the liquid level 25a and has a larger portion submerged, as it can be seen in the figure 1.

Fig. 4 allows likewise to note a couple of crossed walls 10, which extend in the interior of said tubular element 2 from the area in which the sector with holes 2d ends, up to its directly opposite end, acting as anti-swirling elements, which will allow to obtain an axial flow primarily laminar.

To supply the additives or ingredients to the apparatus a feeding hopper 15 has been foreseen, associated to the mouthpiece of the tank 1, in upright alignment with the mouthpiece of the funnel-shaped portion 2a of the element 2. Adjacent to said feeding hopper 15 there is a lid 14 covering a great part of the mouthpiece of the tank 1. The feeding hopper 15 is placed near one of the side walls of the tank 1 in order to facilitate the loading of the product by a worker through a side stair 16 ending in a platform 16a.

A unit such as a grinding mill 17 driven by an electric engine 18 through a belt transmission 19 causes a closed circuit flow by sucking the liquid from the tank 1 through the pierced sector 2d with holes 9 of the element 2, to its interior and through the sleeve 3 and impelling such liquid once it passed through the mill 17 through the ducts 20 and 21 the first one flexible to avoid vibrations toward the bottom of the tank 1.

A three-way valve 22 to direct the liquid flow to the interior of the tank 1 or to the exterior by the ducts 23 or 24, selectively, allowing in the later case the emptying of the tank. The inverted frustum-conical lower section of the tank avoids the accumulation of substances on the bottom by decanting and facilitates a whole emptying of said tank.

Fig. 1 shows likewise the supporting frame 26 of the tank unit raised, as well as a stair 16 ending in a platform 16a to have access to that tank and to make the different products loading easier. One can likewise note the joints 29 linking ducts 20 and 21 which include linking elements 30.

Figs. 5 to 7 show different tubular elements 2, which are only distinguished by their funnel shaped portion 2a and by the different length of their tubular portions, being likewise provided with supporting arms 6, allowing the preparation of different amounts of dissolution or dispersion with a same tank.

Fig. 3 show in detail the elements cooperating in the coupling of the lower end of the stiff sleeve 3 ending in a bevelled edge 3a abutting against a bell-mouthed annular joint 31 lodged within a bushing 32. The upper ring 4 bears an inner guiding collar 34 and the upper end of the sleeve 3 is provided with an inner anti-wearing bush 33.

Figs. 1 and 2 show likewise a mechanism to selectively raise the sleeve 3, comprising a horizontal axis 12 transversal to the inverted frustum conical lower section of the tank 1, held by its ends by bushings 34 and which extends outside the tank by one of its ends and is connected to a driving lever 13. Two bars 11 perpendicular to the axis 12 ending in slots 11a, are slidably connected to side pins 3b of the sleeve 3. The mechanism allow from outside a displacement of the sleeve 3 from its seat on annular joint 31 to empty the tank once the mixture is prepared. It has also foreseen in order to avoid the decanting of substances that a slight leakage of fluid towards the draining duct 5 is provided between the bevelled edge 3a and the bellmouthed seat of the annular joint 31, by incorporating in said seat some generatrix ribs.

Last, Fig. 8 shows a graphic stating the stability of the foam in the dissolution or dispersion obtained, in the event of a 8% proteinic brine concentration, the abscissa axis stating the time with the initial T, and the ordinates axis stating with the initial A the concentration of brine in ml in relation with the foam likewise stated in ml measured in a 1000 ml test glass. The curve p shows the result using the apparatus of the invention and the curve q, a conventional apparatus. Above data will depend in each case of the composition of the brine under consideration, but evidence the much speedier suppression of the foam formed when using the apparatus of the invention.

The object of the invention being sufficiently described, it is pointed out that the invention includes any variation of details which should not alter the essentiality of the invention which is summarized in following claims.

Claims

1.- Apparatus for dissolving or dispersing powder products of different nature in a liquid, devised, namely, for preparing brine having high proteic rate and foaming capacity, characterized in that it comprises:

- a) a tank to store the starting liquid with an inverted frustum conical lower section;
- b) a tubular element, uprightly oriented, ending at

its top in a funnel-shaped section, and its other end arranged, slidably socketed, in telescopic assembly, within a vertical stiff sleeve with its upper end supported and guided and by its lower end in abutment against a tank draining aperture;

c) radial arms integral with the beginning of the funnel-shaped section of above mentioned tubular element, whose arms are supported on a float coaxial to the said tube, allowing the relative displacement of the tubular element with respect to said stiff sleeve depending on the level of the liquid or mixture in the tank;

d) a sector of the said tubular element, close to the end where the funnel-shaped pattern begins, has its wall provided with a plurality of passing holes, of a preset diameter depending on the characteristics of the product to be handled, the length of the said sector being such that the pierced tubular wall is slightly emerging, at any moment, above the liquid level and a most of it is submerged.

e) several cross or radial walls, extending in the interior of said tubular element from the area where the sector with passing holes ends up to its directly opposite end;

f) a feeding hopper for loading the product to be dissolved or dispersed, associated to the mouthpiece of the said tank, in upright alignment with the mouthpiece of the funnel-shaped section topping said tubular element;

g) means to develop a closed circuit fluid flow by a forced sucking of the liquid from the tank through the sector with holes of the said tubular element joined to the float, and to impel it through a return duct toward the said tank with a passageway through disgregation and/or dispersion means;

h) a three-way valve to direct the liquid flowing through said disgregation and/or dispersion means inwardly or outwardly to the tank, selectively, allowing the tank emptying,

so that a forced axial flow, primarily laminar, of the ingredients and additives added in the liquid is obtained, along the tubular element, without swirling, which is directly feed to the disgregation or grinding means.

2.- Apparatus, as claimed in claim 1 characterized in that the duct to impel back into the tank the liquid flowing through said disgregation or dispersion means flow at a level just over the upper part of the inverted frustum conical section of the tank.

3.- Apparatus, as claimed in claim 1 characterized in that the means to suck the liquid from the tank and to impel it back thereto, are advantageously formed by a grinding mill driven by an electric engine, the grinding-dispersing group embodying means to develop the mentioned sucking-impelling through the said mill shearing moving elements action.

4.- Apparatus, as claimed in claim 3 characterized in that the mouth of the grinding mill is directly coupled to the draining duct at the lower part of the tank.

5.- Apparatus, as claimed in claim 1 characterized in that the means to create a close circuit liquid flow comprise a centrifugal pump and an grinding mill intercalated in the circuit in the sucking duct or in the impulsion duct. 5

6.- Apparatus, as claimed in claim 1, characterized in that it further comprises: 10

a mechanism to selectively raise said stiff sleeve, comprising a horizontal axis transversal to the inverted frustum conical lower section of the tank, held by its ends by bushings, said horizontal axis extending outside the tank by one of its ends and is connected to a driving lever and two bars perpendicular to the axis ending in slots are slidably coupled to side pins of said sleeve. 15

7.- Apparatus as claimed in claim 1 characterized in that it further comprises: 20

different tubular elements, which are only distinguished by their funnel shaped portion and by the different length of their tubular or pierced portions, being provided with supporting arms, allowing the preparation of different amounts of dissolution or dispersion with a same tank. 25

8.- Apparatus as claimed in claim 1, characterized in that it further comprises adjacent to said feeding hopper a lid covering a great part of the mouthpiece of the tank, said feeding hopper being placed near one of the side walls of the tank in order to facilitate the loading of the product by a worker through a side stair ending in a platform. 30

9.- Apparatus as claimed in claim 1, characterized in that said stiff sleeve ends in a bevelled edge abutting against a bellmouthed annular joint lodged within a bushing nearby the drainage aperture and the upper end of said stiff sleeve is provided with an inner anti-wearing bush, and in that the upper centring and guiding ring bears an inner guiding collar. 35 40

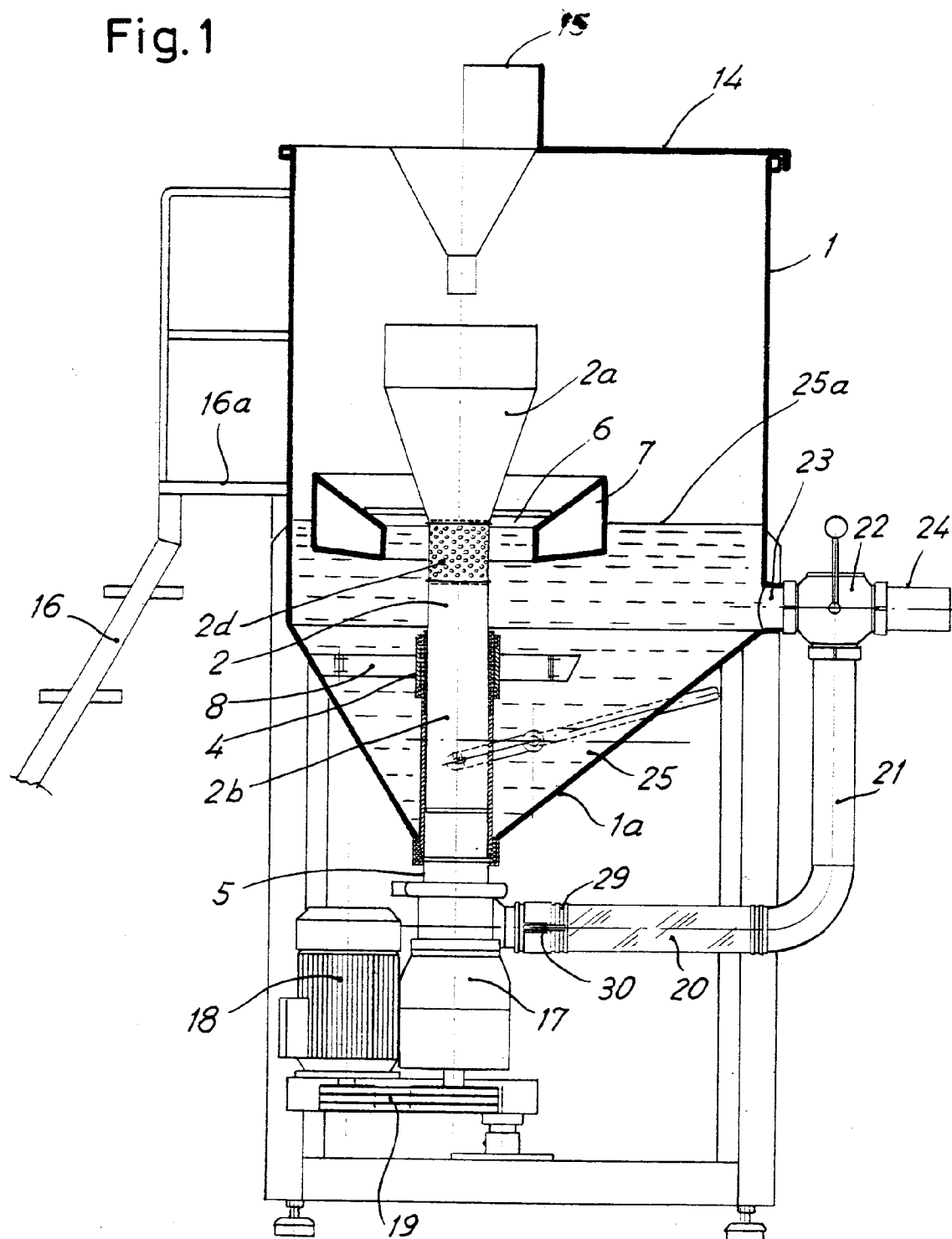
10.- Apparatus as claimed in claim 1, characterized in that said float has a trapezoidal cross-section. 45

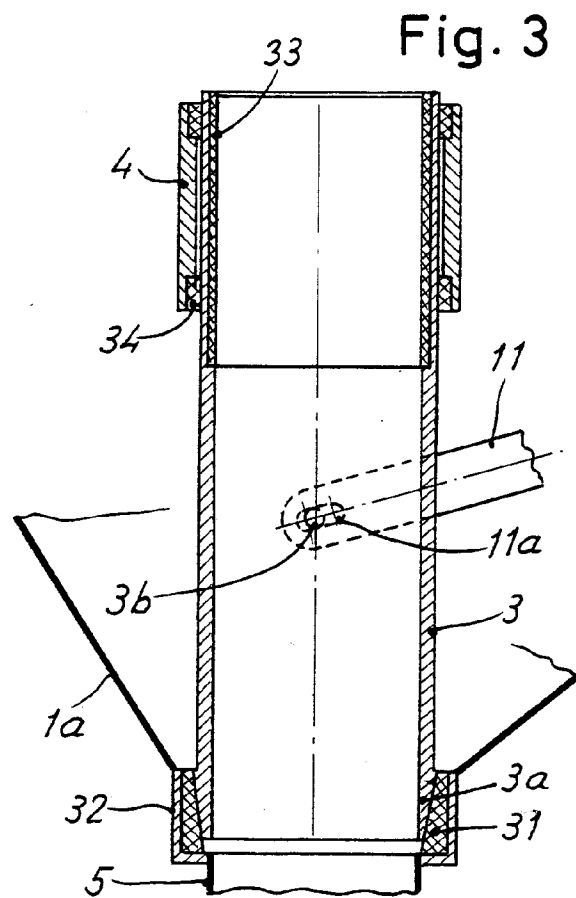
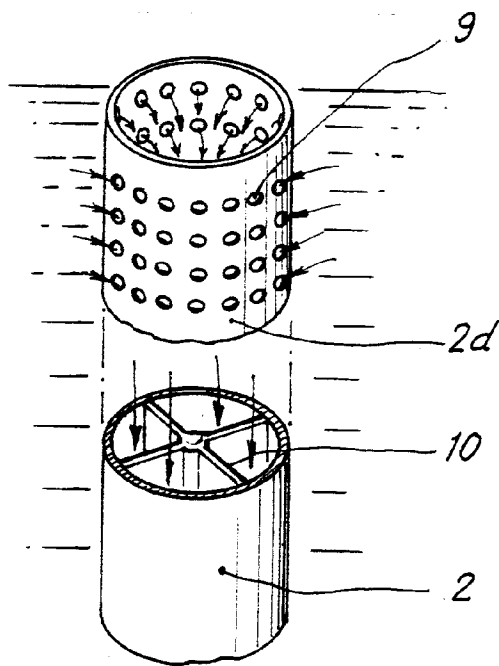
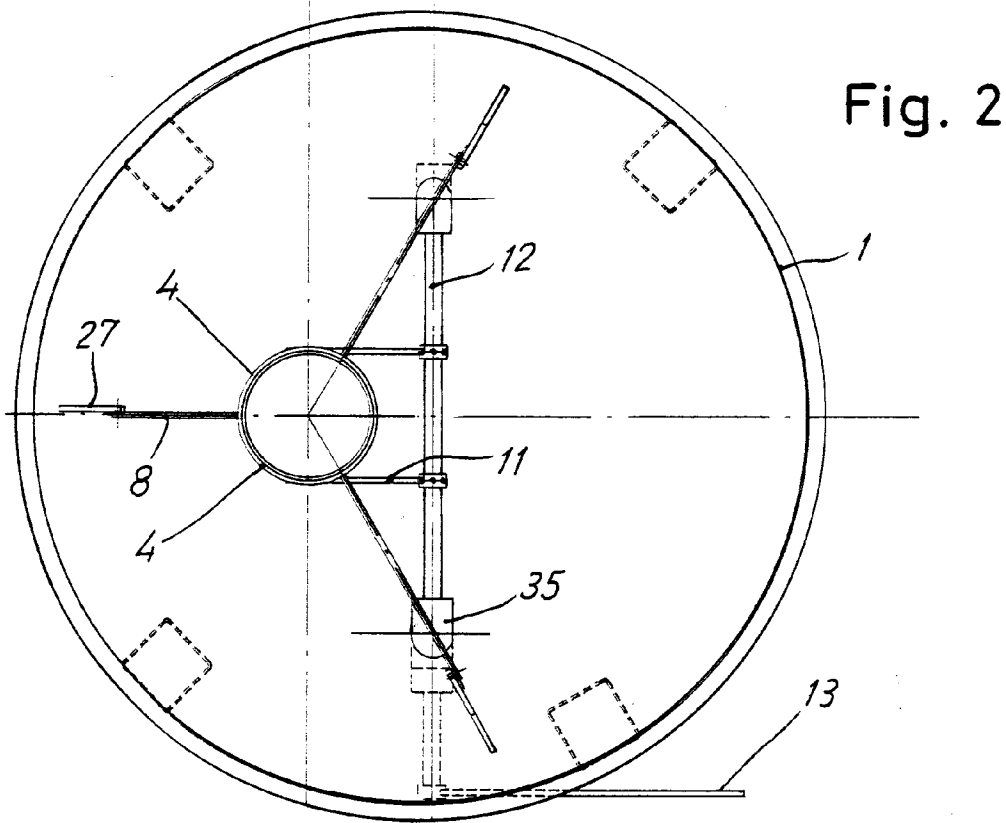
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Fig.1





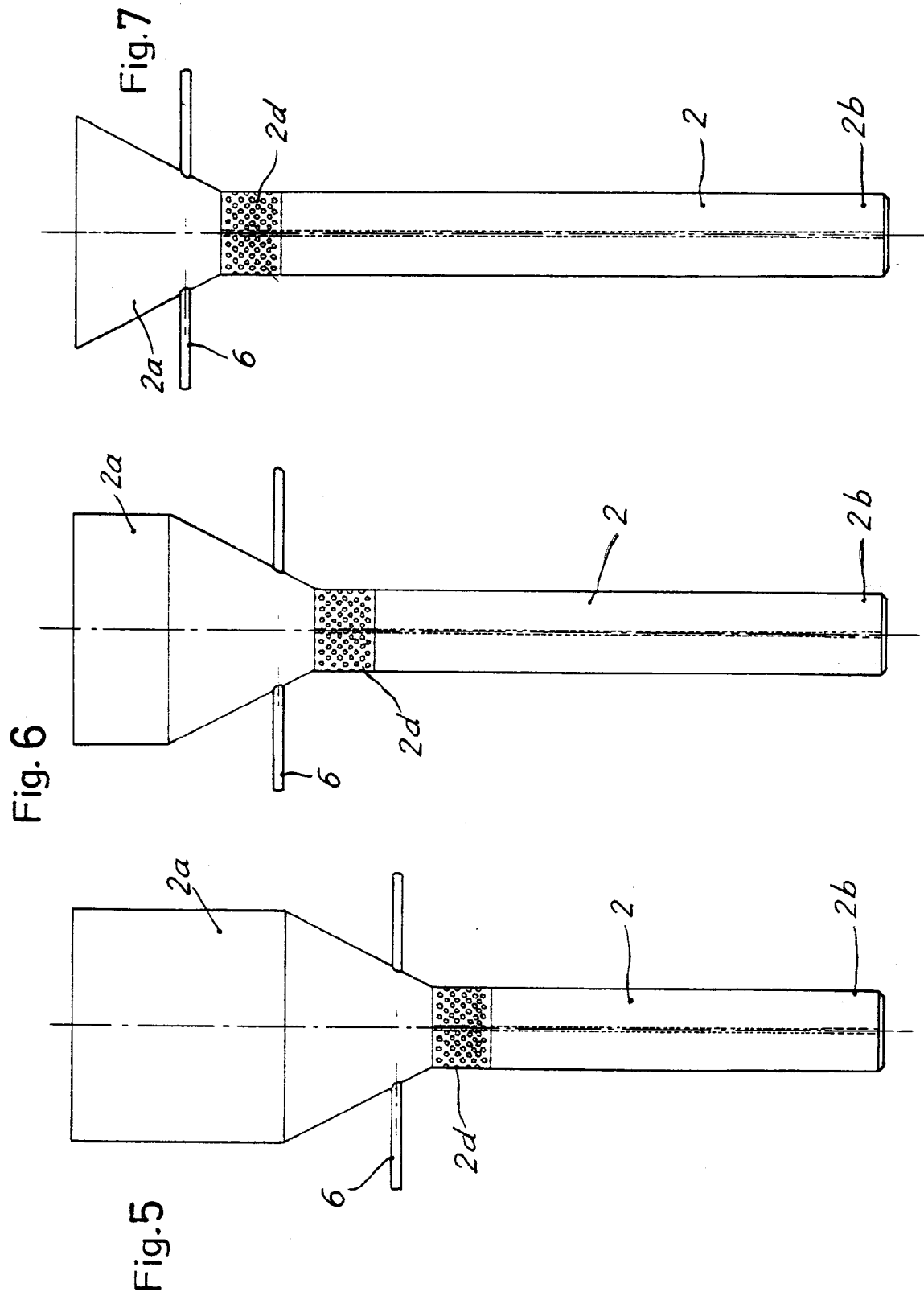
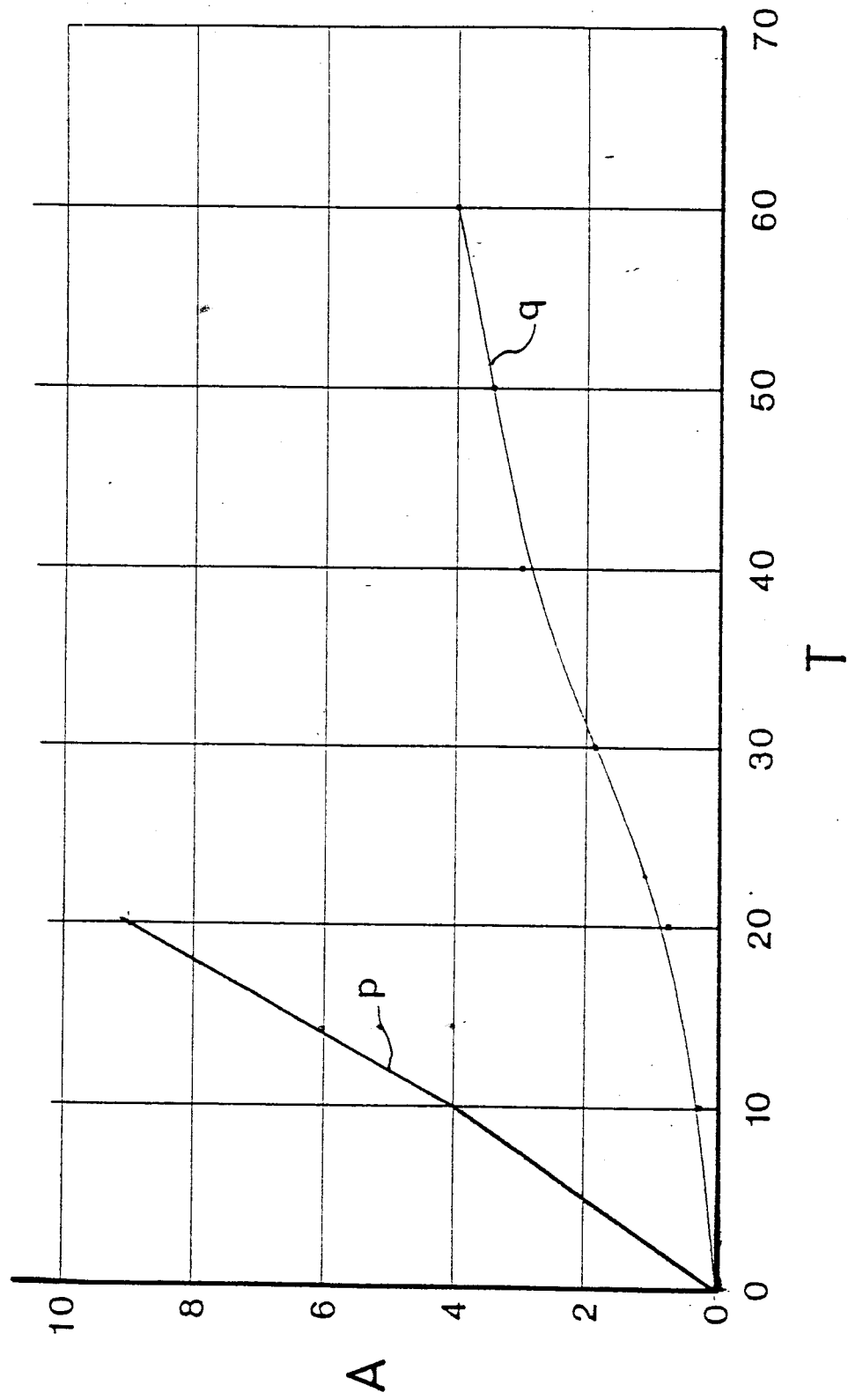


Fig. 8





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 93 50 0063

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-3 727 632 (ANDREW L. PANSINI) * figures 1,2 *	1,2,5	B01F1/00
A	--- NL-A-7 114 100 (JOTEM JORDAAN'S TWENTSE EXPLOITATIE MY) * figure 1 *	1	
A	--- CH-A-628 598 (BORSODI VEGYI KOMBINAT) * figure 1 *	1	
A	--- US-A-3 837 914 (ANGELO CADEO) * figure 1 *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B01F C02F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 06 SEPTEMBER 1993	Examiner DE PAEPE P.F.J.
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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