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(54) **Device for cleaning the inner surfaces of containers in general**

(57) A device for cleaning the inner surfaces of containers in general which comprises, on a supporting frame (1), a body (22,24) for coupling to the mouth of a container to be cleaned. A brush-like element (30) is further provided, which can be inserted in the container (23,25) and can perform a translational motion and a rotation with respect to the axis of the container (23,25). A washing head (41) is provided coaxially to the brush-like element (30) and is able to perform a translational motion with respect to the brush-like element (30).

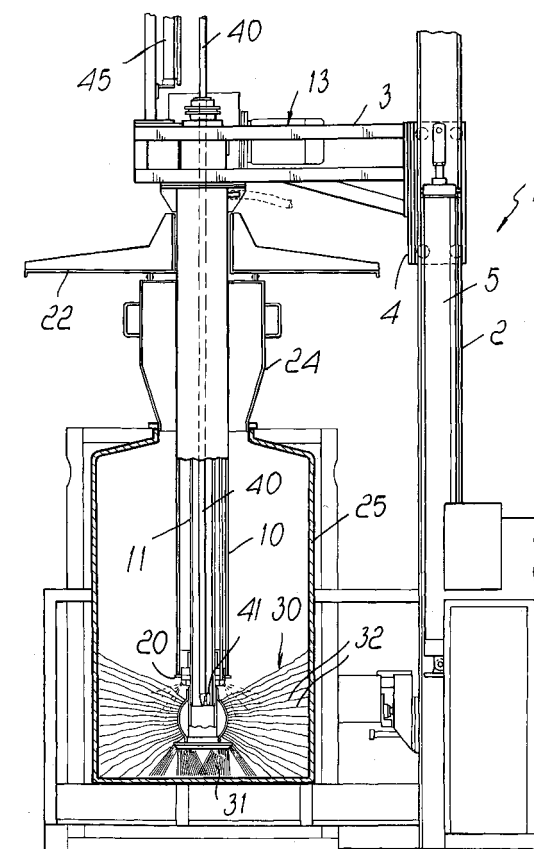


Fig. 2

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Description

[0001] The present invention relates to a device for cleaning the inner surfaces of containers in general.

[0002] It is known that the inner surfaces of containers used in industrial fields are currently cleaned by means of devices which can be of two different types: a first one uses brushes which perform a mechanical action on the surfaces, while a second one uses heads for spraying washing liquid.

[0003] Devices that use brushes are particularly useful in the presence of surfaces having residues of dried paint, sediments of resins, adhesives, residues of silicone on the bottom, but this solution has the drawback of causing deposition of residues of product on the brushes; accordingly, the cleaning operation in progress might be contaminated by the prior use.

[0004] Moreover, the different types of containers commercially available entails the use of different brushes which are designed specifically for each type of container, with the need to proceed with brush replacement, which is mostly performed manually and which, even if it can be performed automatically, always requires complicated cleaning operations.

[0005] Devices using spraying heads have the advantage of being able to reach every point of the walls of the container, regardless of its shape, with a mechanical action produced by the maximum operating pressure, which can be estimated at 40 bar, combined with the chemical action of the cleaning liquid. Even if the product to be cleaned changes, the washing head has no contamination problems, since it is never in direct contact with the products.

[0006] However, this solution is not applicable in case of resistant products, which require a mechanical action that can be achieved only by means of brushes, since current applicable statutory provisions do not allow to exceed a pressure of 40 bar.

[0007] The aim of the invention is to eliminate the above mentioned drawbacks, by providing a device for cleaning the inner surfaces of containers in general which allows to combine the advantages that are typical of the above described solutions without however suffering their drawbacks.

[0008] Within this aim, an object of the invention is to provide a device which makes it possible to clean any kind of container without having to resort to complicated brush cleaning operations.

[0009] Another object of the present invention is to provide a device which, thanks to its particular constructive characteristics, is capable of giving the greatest assurances of reliability and safety in use.

[0010] Another object of the present invention is to provide a device easily obtainable starting from commonly commercially available elements and materials and being further competitive from a merely economical point of view.

[0011] This aim and these and other objects which will

become better apparent hereinafter are achieved by a device for cleaning the inner surfaces of containers in general comprising, on a supporting frame, a body for coupling to the mouth of a container to be cleaned, characterized in that it comprises a brush-like element which can be inserted in said container and can perform a translational motion and a rotation with respect to the axis of said container, a washing head being provided coaxially to said brush-like element and being able to perform a translational motion with respect to said brush-like element.

[0012] Further characteristics and advantages will become better apparent from the description of a preferred but not exclusive embodiment of a device for cleaning the internal surfaces of containers in general, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a schematic overall view of the device according to the invention;

Figure 2 is a view of the step of cleaning, by means of the brush, the bottom of a container having a narrow mouth;

Figure 3 is a schematic view of the step of cleaning a container by means of the spray head;

Figure 4 is a schematic view of the step of cleaning the bottom of a container which is open at the top;

Figure 5 is an enlarged-scale view of the detail of the connection between the brush-like element and the washing head.

[0013] With reference to the figures, the device for cleaning the inner surfaces of containers in general comprises a supporting frame, generally designated by the reference numeral 1, which defines a post 2 on which a transverse arm 3 can slide; such arm is supported by a slider 4 which is provided with wheels for sliding with respect to the post 2 and is connected to a cylinder for vertical translational motion which is generally designated by the reference numeral 5.

[0014] The transverse arm 3 supports an outer tubular element 10 inside which there is an inner tubular element 11 which is supported so that it can rotate with respect to the outer tubular element 10 by interposing bearings 12 and by the action of motor means 13 which are supported by the arm 3.

[0015] The inner tubular element can thus rotate about a vertical axis.

[0016] The outer tubular element has, in a downward region, a flange 20 which engages in a downward region a body for coupling to the mouth of the container to be cleaned, which can be constituted by a disk 22 in the case of containers 23 of the open type or by a housing 24 in the case of containers 25 having a narrow mouth.

[0017] By way of the flange 20, upon engagement the plate 22 or the housing 24 engage hermetically the upper edge of the container, allowing the translational motion inside the container 23 or 25 of the outer tubular

element 10, which is rigidly connected to the arm 3.

[0018] A brush-like element, generally designated by the reference numeral 30, is connected to the lower end of the inner tubular element 11, can be of different types and is constituted, for example, by lower scraper bristles 31 around which there are long bristles 32 which clean the side walls by spreading out due to centrifugal force.

[0019] An important feature of the invention consists in that, coaxially with respect to the brush-like element, an inner duct 40 is provided which can perform a translational motion hermetically with respect to the inner tubular element 11, which supports in a downward region a washing head 41 described in greater detail hereinafter, and is connected in an upward region to translational motion means being constituted by an upper cylinder 45 which acts on the end of the duct 40 so as to perform a translational motion with respect to the inner tubular element 11 and accordingly with respect to the brush-like element.

[0020] The internal duct 40 can perform a translational motion with respect to the inner tubular element 11, so as to arrange the washing head 41 below the brush-like element, as shown in Figure 3, thereby allowing to perform, with the same device, cleaning by means of the washing head.

[0021] The washing head can rotate, revolve and perform an upward and downward translational motion.

[0022] The washing head can be used in combination with the brush-like element or separately from it.

[0023] In this way it is possible to combine in a single device the typical advantages of cleaning by means of a brush-like element and the typical advantages of cleaning by means of a washing head without having to face the corresponding drawbacks.

[0024] Moreover, the washing head, which can be extracted with respect to the brush-like element, allows to clean the brush-like element by means of said washing head, thus solving directly in the device the problem linked to the cleanliness and cleaning of the brush-like elements.

[0025] From the above description it is evident that the invention achieves the intended aim and objects, and in particular the fact is stressed that is possible to combine the action of the cleaning brush and of the pressure head, obtaining a particular synergistic effect which allows to enjoy the advantages of the solutions of the known art without however suffering their drawbacks, thus solving a problem which is strongly felt in the art.

[0026] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0027] All the details may further be replaced with other technically equivalent elements.

[0028] In practice, the materials used, as well as the contingent shapes and dimensions, may be any according to requirements.

[0029] The disclosures in Italian Patent Application No. MI2001A000408 from which this application claims

priority are incorporated herein by reference.

[0030] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A device for cleaning the inner surfaces of containers in general, comprising, on a supporting frame (1), a body (22,24) for coupling to the mouth of a container (23,25) to be cleaned, **characterized in that** it comprises a brush-like element (30) which can be inserted in said container (23,25) and can perform a translational motion and a rotation with respect to the axis of said container (23,25), a washing head (41) being provided coaxially to said brush-like element (30) and being able to perform a translational motion with respect to said brush-like element (30).
2. The device according to claim 1, **characterized in that** said supporting frame (1) forms a post (2) on which a transverse arm (3) can slide, said arm (3) supporting an outer tubular element (10) inside which an inner tubular element (11) is rotatably supported, said inner tubular element (11) being provided with said brush-like element (30) at its lower end.
3. The device according to one or more of the preceding claims, **characterized in that** said brush-like element (30) comprises lower scraper bristles (31) around which there are long bristles (32) which are adapted to spread out due to centrifugal force.
4. The device according to one or more of the preceding claims, **characterized in that** it comprises, coaxially to said inner tubular element (11), an internal duct (40) which can perform a translational motion hermetically with respect to said inner tubular element (11), said inner duct (40) supporting said washing head (41) in a downward region.
5. The device according to one or more of the preceding claims, **characterized in that** it comprises means (45) for the translational motion of said inner duct (40), said means being constituted by an upper cylinder (45) which is supported by said transverse arm (3) and acts on the end of said duct (40).
6. The device according to one or more of the preceding claims, **characterized in that** said washing head (41) is provided with a rotary motion, a revol-

ing motion and a translational motion along the vertical axis.

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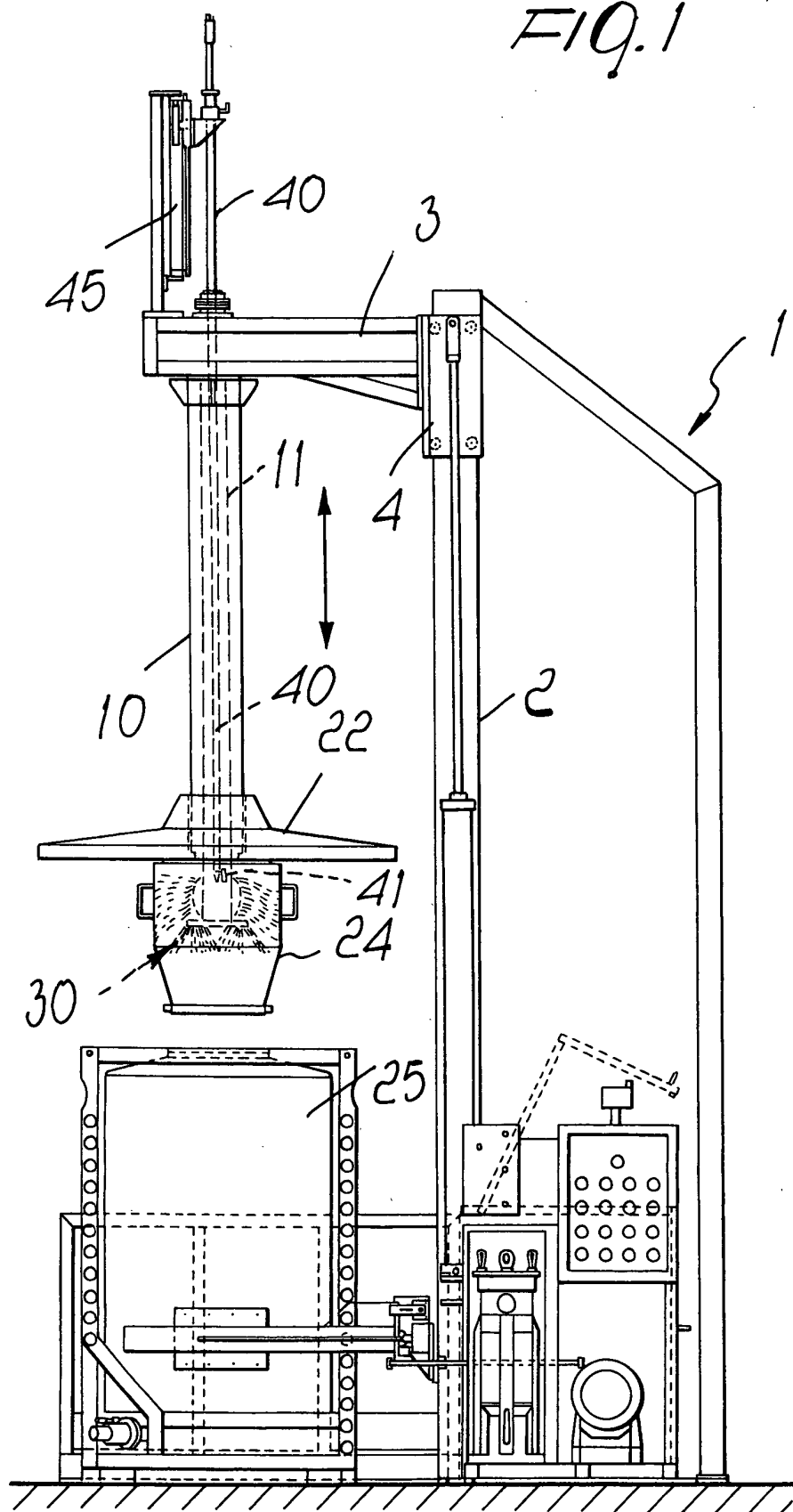
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Fig. 1



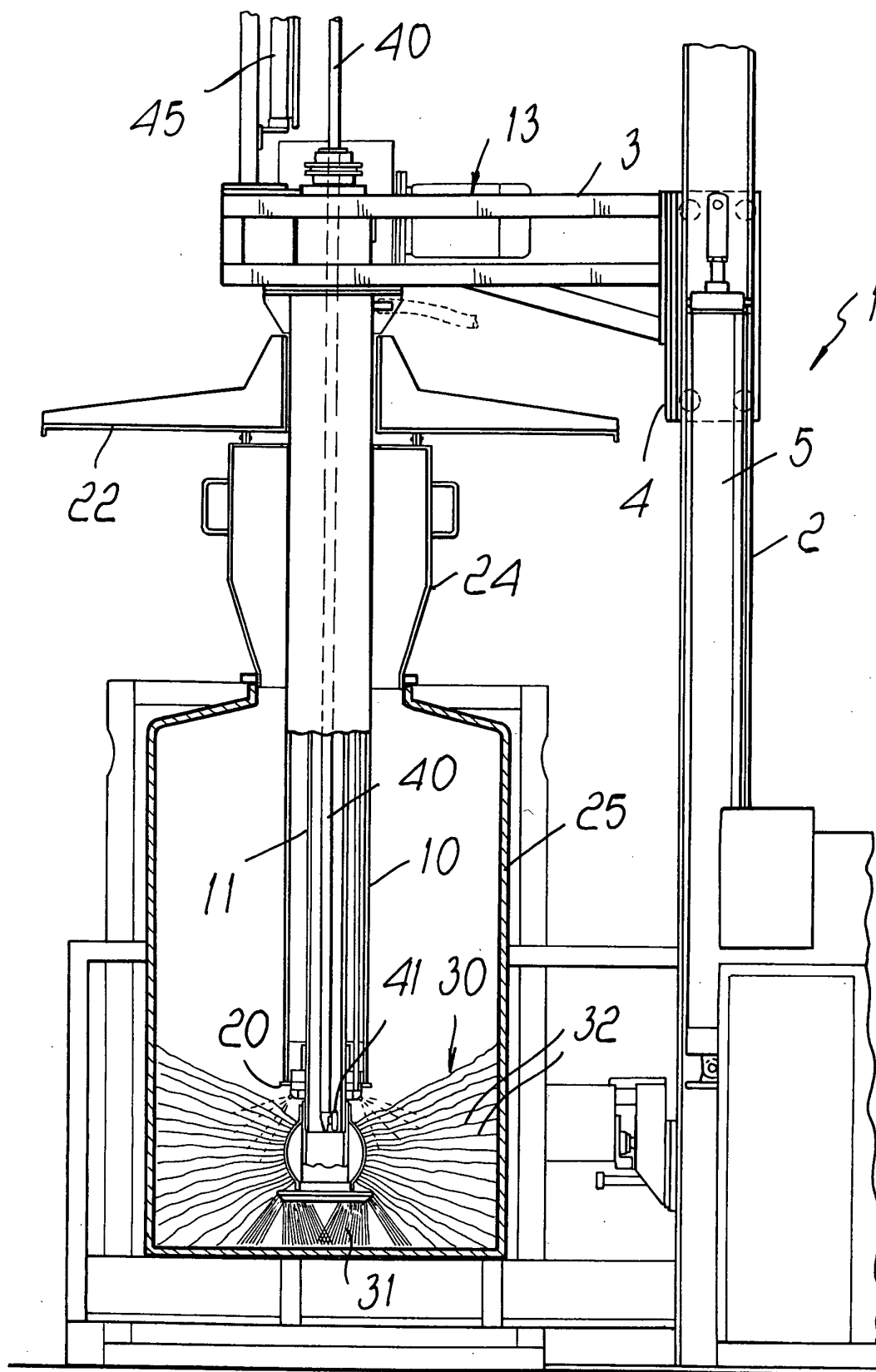


Fig. 2

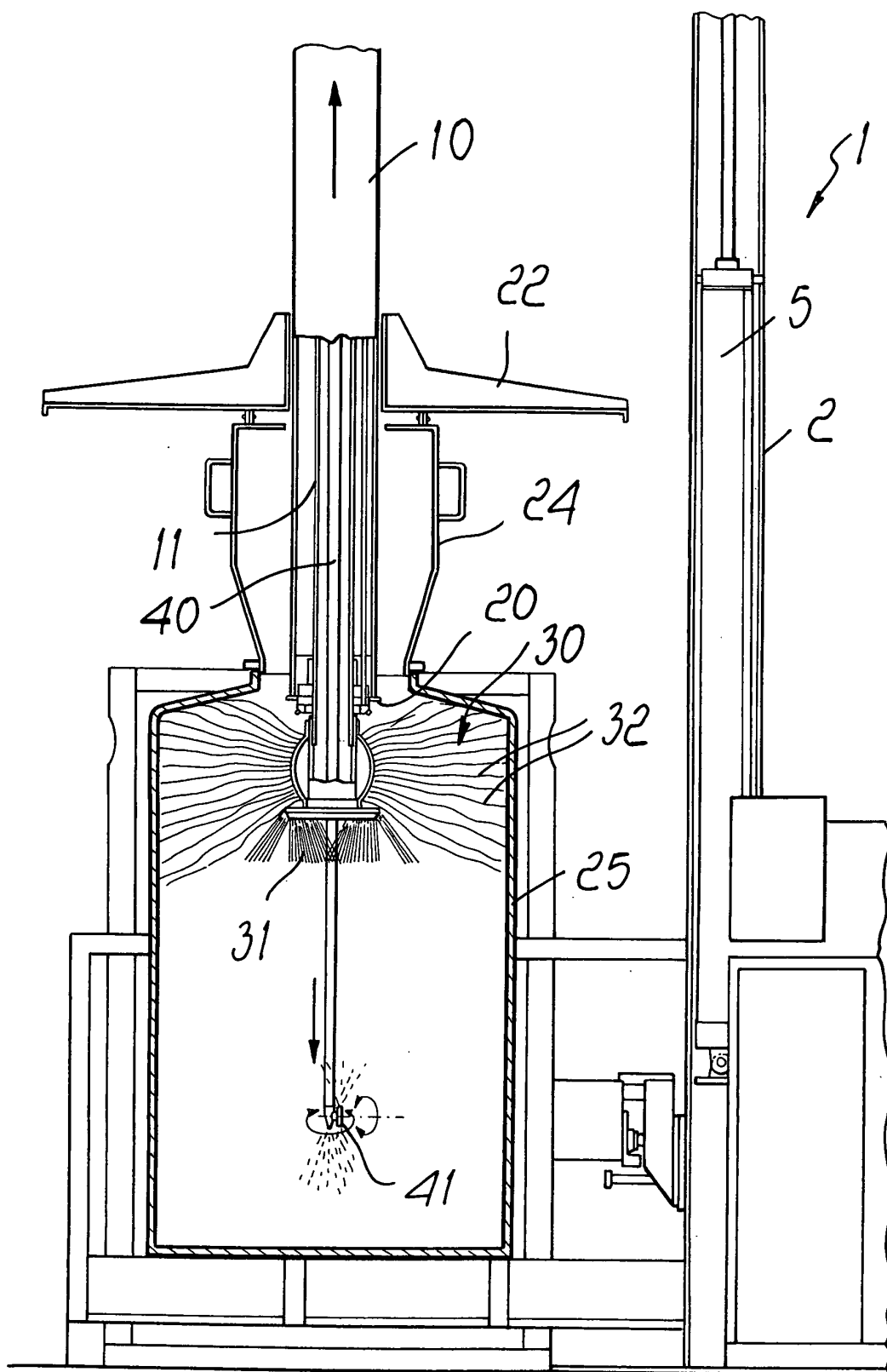


Fig. 3

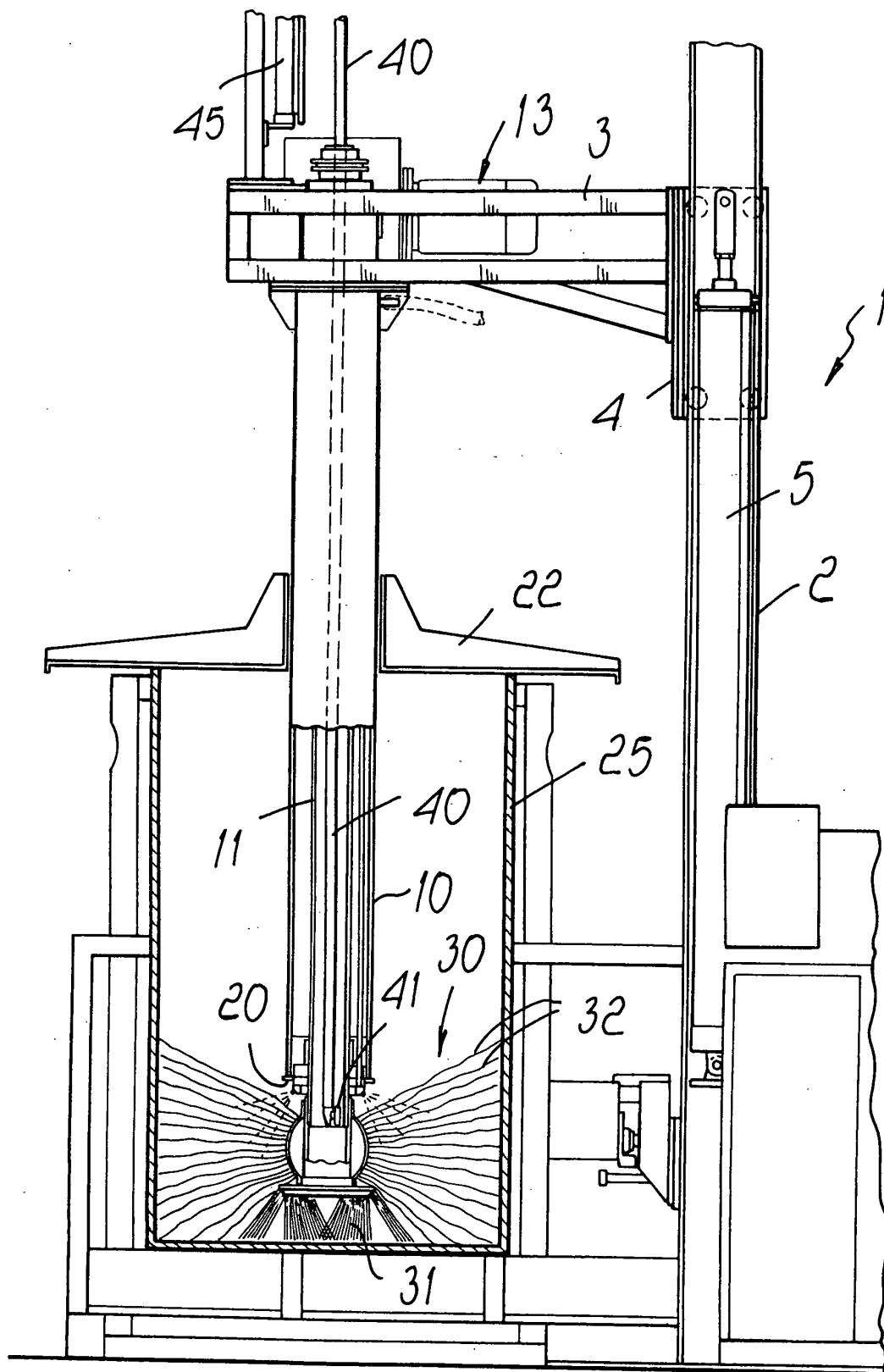
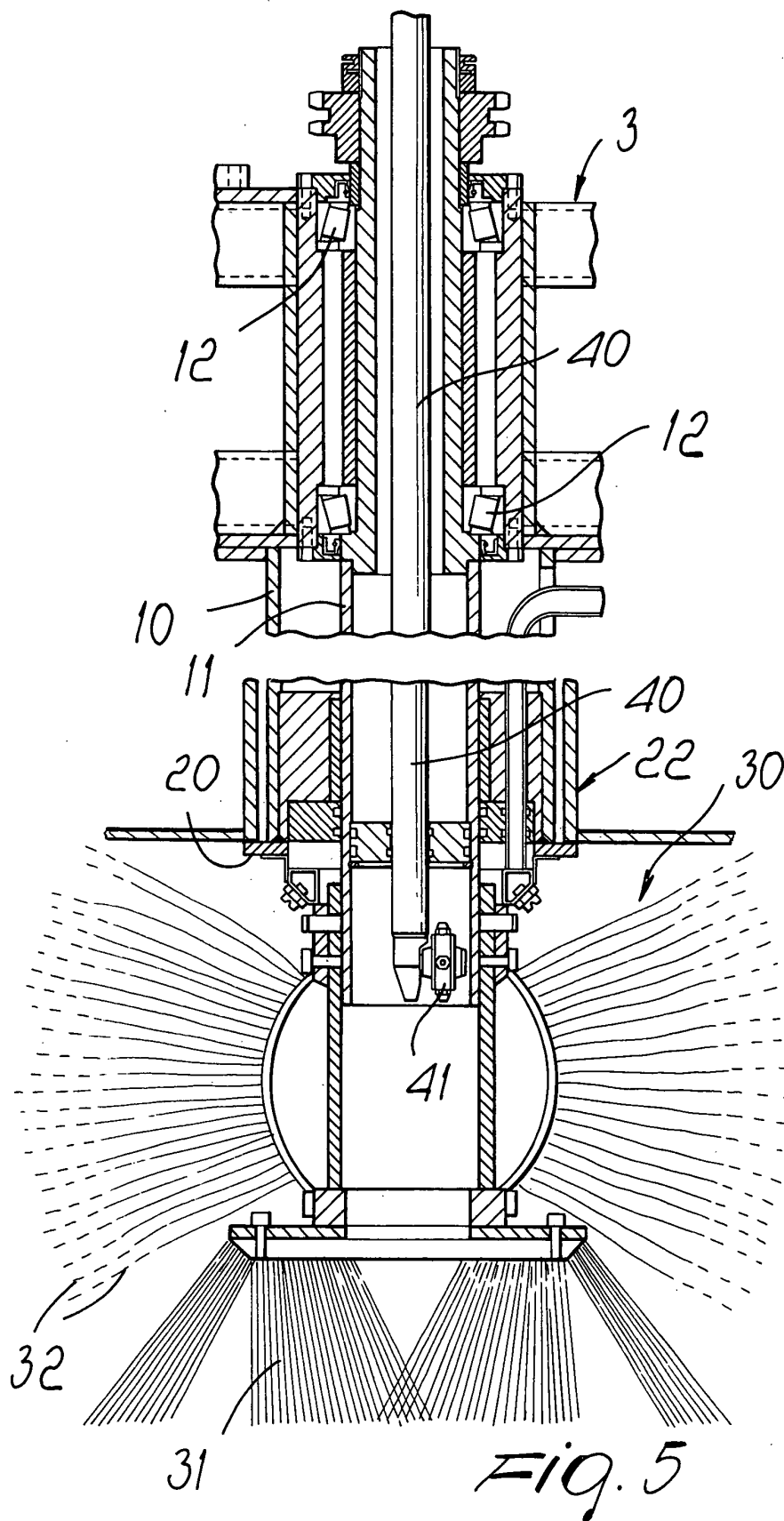


FIG. 4





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EUROPEAN SEARCH REPORT

Application Number
EP 01 11 3618

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Y	US 3 992 745 A (LAURILA) 23 November 1976 (1976-11-23)	1	B08B9/08
A	* column 4, line 25 - column 5, line 46; figures *	6	
Y	DE 198 34 438 A (TRANSPORTE WAIZINGER GMBH & CO. KG) 4 March 1999 (1999-03-04)	1	
A	* column 2, line 41 - column 3, line 12; figure *	6	
A	EP 0 559 037 A (RIO BEER MASCHINENFABRIK AG) 8 September 1993 (1993-09-08) * abstract * * column 2, line 27 - column 3, line 3; figures *	1,6	
A	DE 32 42 877 C (GUIDO OBERDORFER WAP - MASCHINEN) 7 June 1984 (1984-06-07) * column 1, line 46 - line 52 * * column 3, line 51 - line 52; figure 1 *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
A	DE 296 13 498 U (ADILI) 21 November 1996 (1996-11-21) * the whole document *	1,6	B08B A46B B05B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 24 September 2001	Examiner Van der Zee, W
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			

EPC FORM 1503 03.92 (PC4C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 01 11 3618

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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