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(72) Inventor: **Persello, Silvia**  
**33030 Rive d'Arcano Fraz. Rodeano Alto (IT)**

(74) Representative:  
**Petraz, Gilberto Luigi et al**  
**GLP S.r.l.**  
**Piazzale Cavedalis 6/2**  
**33100 Udine (IT)**

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(71) Applicant: **Persello, Silvia**  
**33030 Rive d'Arcano Fraz. Rodeano Alto (IT)**

(54) **Floor-mounted device for the hygiene and brushing of footwear**

(57) Floor-mounted device for the hygiene and brushing of footwear, particularly fit for food-processing plants, laboratories, hospitals, sport and skiing centers, hotels or exhibition halls, the device including a floor-mounted supporting structure (11) and a plurality of rotating brushes (13), having a substantially horizontal axis (13) linked to the engine mechanisms (14), which form a pass-way defining a direction for the user while moving forward along the structure, such floor-mounted structure (11) including longitudinal bars with nicks (12)

and/or transversal bars (112a, 112b) for the clamping of the ends of the brushes (13), these brushes (13) being sprayed with the washing liquid, beneath the floor-mounted structure (11) there being located a supply tank (31) of such liquid, the brushes (13) being provided, at least at one of their ends, with quick-mounting/dismounting mechanisms that cooperate with the abovementioned longitudinal bars (12) and/or the transversal bars (112a, 112b).

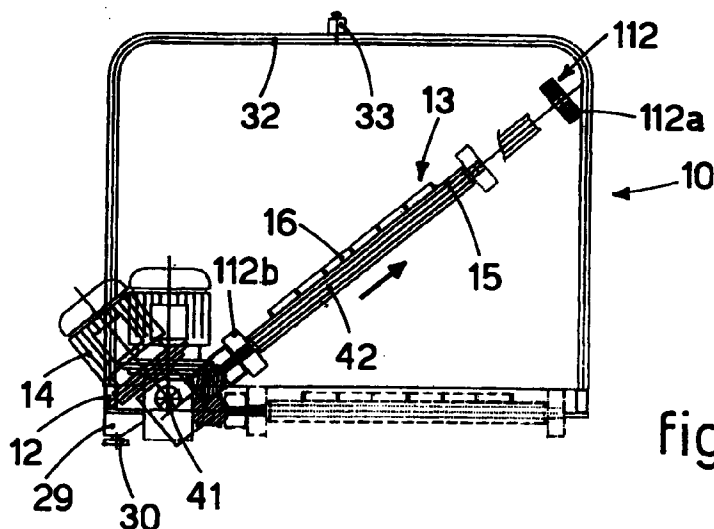


fig.9

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## Description

### FIELD OF THE INVENTION

[0001] This invention concerns a floor-mounted device for the hygiene and brushing of footwear as set forth in the main claim.

[0002] The invention can be employed in the interiors where contamination risks must be reduced through washing and/or disinfecting footwear such as, more in detail, food-processing plants, hospitals, laboratories, cattle-breeding plants, or else sport and skiing centers, hotel or exhibition halls, etc.

### BACKGROUND OF THE INVENTION

[0003] Of wide use are various types of equipment for cleaning, washing and disinfecting footwear which normally include a supporting structure and one or more rotating brushes mounted on it; such brushes have a horizontal or vertical axis and are kept washed by a cleaning/disinfecting liquid.

[0004] In this case, users stand on the rotating brushes that wash their soles, vamps and, if possible, boot-legs up to a certain height.

[0005] Of current use is also a type of washing equipment which comprises a floor-mounted or a belt conveyor structure covering a basically horizontal plane that forms a pass-way set for the user. The rotating brushes are arranged crosswise to the direction of the pass-way, in order to allow the progressive washing of footwear while the user is moving forward. By being located at the entrance of premises such equipment is a preset pass-way that forces people to enter or leave only after undergoing the footwear washing.

[0006] The equipment currently in use is affected by a series of drawbacks which determine relevant operating costs and inconvenient technical assistance.

[0007] More in detail, the brushes are subject to short-term wearing as well as irregular kinking due to the continuous one-way rotary friction against footwear, which makes it necessary to frequently replace them. That brings about considerable costs for the spare parts and prolonged maintenance, as it is indispensable to dismount and re-mount the bars with nicks of the supporting structure on which the brushes are installed.

[0008] Another limitation of the equipment in use is the difficulty in adjusting the supply of the washing liquid in terms of both mixing percentages and delivery, relevant waste being thus caused under certain working conditions.

[0009] One further drawback is the position of the equipment start-stop buttons that are often out of easy reach; as a result, users are forced to take uncomfortable positions which may be even dangerous where the equipment is working.

[0010] Other problems of the equipment in use are the low degree of safety and the absence of a pass-way

users must compulsorily move forward on once the brushes are set going. Moreover, owing to their size such an equipment does not often find easy location within interiors of limited dimensions or at narrow entrances.

[0011] The present Applicant has designed, tested and embodied this invention to overcome the shortcomings of the state of the art and to obtain further advantages.

### SUMMARY OF THE INVENTION

[0012] This invention is set forth and characterised in the main claim, while the dependent claims describe further characteristics of the idea of the main invention.

[0013] The purpose of this invention is to achieve a floor-mounted device for the hygiene and brushing of footwear that may allow quick and simple technical assistance and, most importantly, effortless replacement of the brushes. The device is also meant to guarantee longer life and higher efficiency of the brushes so as to limit in time their replacement.

[0014] A further purpose of the invention is to supply a device of small size that can be installed even in limited space.

[0015] This invention is also aimed to supply a device that makes it possible for the user to reach the on/off buttons with no effort or risk whatsoever in conformity with the accident prevention standards. An additional purpose is an even washing liquid supply both in terms of delivery and mixing.

[0016] According to the invention the device includes a floor-mounted or a belt conveyor structure complete with, in a first embodiment, a plurality of rotating brushes that are lined up crosswise to the direction followed by the user while moving forward along the structure, and arranged in succession thus forming the pass-way.

[0017] In one further embodiment of the invention the brushes are arranged longitudinally parallel to the abovementioned direction of the user.

[0018] In this last embodiment, a highly efficient cleaning effect is achieved in that by rotating crosswise to the surface of the footwear soles the bristles of the brushes penetrate more deeply into the gaps and finishings of the very soles.

[0019] According to one embodiment of the invention, the brushes are connected/disconnected at their ends, either by means of constrained coupling joints or in a single block, to the nicks of the supporting structure, which makes the brushes project inwards.

[0020] According to a variant, every brush can be axially extracted out of a respective supporting and rotation-driving shaft.

[0021] According to a further development of this last embodiment, the axial extraction is possible after accomplishing a rotation of the set of brushes along with their respective shafts upward of the underlying

structure surface.

**[0022]** According to a variant, the device can be also equipped with the brushes having a vertical axis of rotation and arranged, for example, two by two on both sides and/or at the centre of the floor-mounted supporting structure.

**[0023]** According to a further variant, where the brushes have an axis arranged parallel to the direction of the user while moving forward along the structure, at least part of such brushes are staggered on the horizontal plane in order to accomplish the cleaning of at least part of the side edge of the sole.

**[0024]** According to a further variant of this invention, not fewer than two brushes are set one upon the other on at least one side of the floor-mounted structure so as to form a pass-way corridor that allows the cleaning of at least part of the bootleg while the user is moving forward along the structure.

**[0025]** According to another variant, the clamping of the brushes on the coupling joints is carried out by screws.

**[0026]** One further variant makes the clamping possible through quick-coupling mechanisms.

**[0027]** At least one coupling joint on every brush is in contact with the driving mechanisms, which are also connected to the engine, of the brush rotary motion.

**[0028]** In a variant of the invention the abovementioned driving mechanisms consist of cogged wheels arranged in succession and engaged one with the other, while the brushes turn in alternate rotary motion. According to a variant, the driving mechanisms correspond to pinion chains and all the brushes turn in the same direction.

**[0029]** According to a variant, it is possible to supply a bascule floor-mounted structure that is flush down with a supporting base on which the washing liquid deliverers are mounted. At the same level of the base, underneath the supporting structure, it is where the liquid tank is located which can be equipped with or without the liquid recycling system.

**[0030]** The base mentioned above is connected to the engine control unit and the washing liquid supply and adjustment unit, the latter allowing to set the delivery and adjust the composition mixture of the washing liquid in compliance with any individual requirement.

**[0031]** According to one variant, the disinfecting mixture is produced by a "venturi" dispenser.

**[0032]** On one side of the floor-mounted supporting structure there is at least one handrail, or two preferably, substantially covering the whole length of its surface.

**[0033]** One of these handrails at least is equipped with the start-stop buttons.

**[0034]** According to a variant, a start-stop button is mounted on both handrails. In a preferential embodiment of the invention the start-stop buttons are located in an intermediate position, so that they can be easily reached regardless where the user is standing.

**[0035]** According to another variant, the start-stop but-

tons are embedded in a slideway which is mounted on the handrails; therefore, on moving forward all the surface through the user is holding such a slideway. When the user releases the control device, a return-stroke system sets it back to its original position.

**[0036]** Such an embodiment allows to build even long surfaces of the structure in conformity with the accident prevention standards which set forth that the user be in a position to operate and disconnect the device at any time.

**[0037]** According to one further variant, the entrance and/or exit of the floor-mounted structure are provided with bars which make it impossible to move forward unless the brushes have effectively been set going.

**[0038]** In a further variant the entrance and/or the exit of the floor-mounted structure are provided with a photocell device in order to start up or stop the engine operating the brushes whenever the user respectively enters or leaves the very structure.

**[0039]** In a further embodiment, the engine is located inside the floor-based or belt conveyor structure. According to the invention, the rotary motion of the brushes is reversible, which allows to vary the working cycle of the device and, as a result, to guarantee uniform and harder wearing of the brushes without their bristles being subject to one-side kinking.

**[0040]** Besides making easier the maintenance/replacement of the brushes, this invention simplifies both the cleaning of the washing liquid tank and the maintenance of the liquid pipings and deliverers as it is possible to lift the supporting structure out of its base.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0041]** The attached figures are given as a non-restrictive example and show some preferential embodiments of the invention as follows:

- Fig. 1 shows a partly sectional side view of one first embodiment of the device according to the invention;
- Fig. 2 shows section "A-A" of fig. 1;
- Fig. 3 shows the view from "C" of fig. 2;
- Fig. 3a shows a variant of fig. 3;
- Fig. 4 shows a detail of the brush shown in fig. 1;
- Fig. 5 shows section "B-B" of fig. 2.
- Fig. 6 shows a front view of a further embodiment of the device according to the invention;
- Fig. 7 shows the top view of fig. 6;
- Fig. 8 shows a longitudinal section of one brush in the device shown in fig. 6;
- Fig. 9 shows a side view of fig. 6 along with a schematic layout of the brush extraction mechanism;
- Fig. 10 shows a side view of a variant of fig. 6;
- Fig. 11 shows the front view of fig. 10;
- Fig. 12 shows a variant of fig. 10;
- Fig. 13 shows the front view of fig. 12.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0042]** With reference to the figures, number 10 indicates the device for the hygiene and brushing of footwear according to the invention.

**[0043]** Such device 10 includes the floor-mounted or belt conveyor structure 11 on which the user moves forward to have his footwear washed without taking it off. The floor-mounted supporting structure 11 has on its sides two longitudinal bars with nicks 12 connected to a plurality of brushes 13 which, in the embodiment shown in figg. 1-5, are arranged in succession at the same level, transversely to the bars with nicks 12, and made to rotate by an engine 14.

**[0044]** The brushes 13 are schematically represented by the sole supporting roll 15 of the bristles 16.

**[0045]** In the variant shown in fig. 3a the device 10 is also equipped with three brushes 113 having a vertical rotation axis, two of which are arranged at its sides and one in the centre, so as to allow even the cleaning of the vamp and the upper part of the footwear.

**[0046]** The brushes 13 are connected to the ends of the bars with nicks 12 by means of coupling joints, that is the first joint 17a and the second joint 17b, which they are removable from.

**[0047]** The coupling joints 17a and 17b cooperate with the respective friction-proof rolling bearings 18a, 18b that are located inside the bars with nicks 12, thus allowing their rotation along with the respective brush 13.

**[0048]** Moreover, each coupling joint 17a, 17b shows a section 117 projecting out of the inner side of the bars with nicks 12 where, in this case, one first female gap 19 is obtained (fig. 4).

**[0049]** The roll 15 of the brushes 13 shows, in this case, at its ends additional male gaps 20 specially fit for gaps 19 into which they are inserted in order to create the constraint between the coupling joints 17a, 17b and the brush 13.

**[0050]** The clamping of the brush 13 on the respective coupling joints 17a, 17b takes place in this case by means of screws which are to be inserted into the proper open holes 21, 22 obtained respectively out of the projecting sections 117 and the additional gaps 20.

**[0051]** This embodiment allows a quick replacement or dismounting of the brushes 13, making it unnecessary to dismount the longitudinal bars with nicks 12 or other parts of the device 10.

**[0052]** In the embodiment shown in the figure the rotary motion drive of the brushes 13 is carried out through the cogged wheels 23. The wheels are connected to or embodied in at least one of the coupling joints, in this case the first one 17a, of each brush 13. Such cogged wheels 23 are interlocked one with the other so as to allow the motion drive and they are set going by a driving cogged wheel 24 which is connected to the engine shaft 14.

**[0053]** In this case, the plant is also equipped with an intermediate cogged wheel 25 that provides a link between the driving cogged wheel 24 and the first cogged wheel 23 which in turn is connected to the brushes 13. The cogged wheels 23, 24, 25 are screened by a casing 26 (figg. 3, 3a).

**[0054]** According to a variant, the motion to the brushes 13 is driven by a pinion chain-system assuring the rotation of all brushes 13 in the same direction.

**[0055]** The brushes 113 having a vertical rotation axis are made to rotate by angular direction mechanisms (not shown) located on the cogged wheels 23 and are connected at their lower ends to a single coupling joint.

**[0056]** Depending on the use required, the engine 14 can be operated either electrically or by means of compressed fluid, and being located between the bars with nicks 12 it allows considerable space saving.

**[0057]** In the embodiment shown in figg. 6-13 the brushes are arranged longitudinally to the direction of the structure 11, their respective ends being linked with the transversal bars 112a, 112b that are arranged orthogonally to the bars 12.

**[0058]** This embodiment is particularly useful where the cleaning of soles with special and deep gaps is required. The brushes 13, in this case, rotate in a plane perpendicular to the surface of the sole and penetrate into its gaps more deeply, thus removing in a more efficient manner the residuals that may be seeped inside the soles.

**[0059]** In the embodiment shown in fig. 6, the engine 14 is located externally from the longitudinal bars with nicks 12.

**[0060]** The motion drive to the brushes 13 is accomplished through a gear-case 39 interlocked, by means of a kinematic chain not shown here, with the cogged wheel 23 which is linked to the first brush 13 and, accordingly to the other brushes 13 by virtue of the kinematic connection between the cogged wheels 23.

**[0061]** In the embodiment shown in figg. 7-13 the engine 14 is located inside the floor space of the structure 10 which is bounded by the longitudinal bars with nicks 12 and the rotary motion is driven to the cogged wheel 23 of the first brush 13 through the pinion 40.

**[0062]** In the figg. 7 and 8 the engine 14 is located on a horizontal plane lying below the pass-way surface formed by the brushes 13, while in the fig. 9 the engine 14 is vertically arranged at the side of the abovementioned pass-way surface.

**[0063]** As can be seen in fig. 9, the engine 14 is supported by a ball pin 41 that allows its upward rotation.

**[0064]** In this manner, it is possible to rotate off the engine 14 the transversal bar 112a on which the ends of all the brushes 13 are clamped in order to allow the axial extraction.

**[0065]** The brushes 13 are, in fact, formed by a hollow roll 15 supporting the bristles 16 which is axially mortised on the rotation shaft 42 connected to the cogged wheel 23.

[0066] Once the transversal bar 112a is made to rotate from the working position, shown by the dotted lines in fig. 9, to the upward rotated position, it is accordingly easy to axially extract all the rolls 15 along with the bar 112a on which such rolls are fixed, the rotation shafts 42 being kept in their solid position in the respective cogged wheel 23.

[0067] This embodiment makes it extremely easy to replace the rolls 15 with the worn-out bristles 16 and to mount new rolls 15.

[0068] In the variant shown in the figg. 10 and 11 the brushes 13 are staggered on the horizontal surface with the purpose to allow to clean at least part of the edge of the footwear soles.

[0069] In the further variant shown in the figg. 12 and 13 three rows of brushes 13 are included, each of them having three brushes 13 arranged one upon the other, which are alternated with further rows of brushes having only one brush 13.

[0070] This embodiment defines two pass-way corridors 43 that allow even the cleaning of the bootleg where high footwear, such as boots, is employed.

[0071] As can be seen in fig. 12, even in this case the rotary motion to the brushes is driven through the kinematic chain that is located in between the cogged wheels 23.

[0072] The engine 14 is reversible, as it is possible to vary the rotary direction of the brushes 13 for a more uniform and harder wearing.

[0073] While working the brushes 13 are sprayed with washing liquid that may consist of a mixture of water and detergent and/or disinfectant or else of a similar product. Such washing liquid is delivered through the pierced pipes 27, located beneath the brushes 13, and are supplied by means of a proper supply and adjustment unit. The abovementioned supply and adjustment unit 28 includes vibrating diaphragm mechanisms, connected to the engine 14, that set up the supply pressure and, accordingly, the washing liquid delivery.

[0074] Furthermore, such a delivery and adjustment unit 28 comprises the device for altering the composition of the washing liquid mixture. This way, it is possible to set the delivery and the composition of the washing liquid, and by adapting them both to the actual need of employing the device 10 remarkable washing liquid saving is assured.

[0075] According to a variant, the mixture supply system is complete with a suction dispensing device of "venturi" type, where the recirculation of the liquid is absent.

[0076] The floor-mounted supporting structure 11 is supported by a base 29 with feet 30 on which is also located the washing liquid tank 31 provided with a drain-hole (not shown).

[0077] The floor-mounted structure 11 is bascule to the base 29, as it can be lifted (fig. 1) allowing the cleaning of the liquid tank 31 and/or direct inspection of the pierced pipings 27.

[0078] On the sides of the floor-mounted structure 11 two handrails 32 are installed and they basically cover the entire length of the structure itself and support the user of the device 10 while moving forward on it. On at least one of these handrails 32 there is a start-stop button 33 that once pressed by the user operates or disconnects the device 10 through an electrical or pneumatic system.

[0079] The button 33, which is located in an intermediate position, so that it can be easily reached by the user at any time, is connected to the control unit 34 of the engine 14 placed beside the supporting structure 11 and it contains its own adjustment device.

[0080] According to the variant shown in fig. 1, the button 33 is mounted on a slide-way 35 whose guide is located with the inner part of the handrail 32. The abovementioned slide-way button is fixed on one end of a return-stroke device, in this case a spiral wire 36, whose other end is clamped on a fixed block 37 which is placed at the entrance of the structure 11.

[0081] Therefore, the user is in a position to move forward all the surface of the structure 11 through, while holding the button 33 so that during the washing operation he can at any time operate or disconnect the rotation of the brushes 13. Such a contrivance allows to build even long structures 11 in conformity with the accident prevention standards which set forth that the user be capable of controlling the device in all working situations.

[0082] As the user comes to the end of the floor 11 he releases the button 33, the brushes 13 stop and the slide-way 35 is set back to its original position 35a by means of the spiral wire 36.

[0083] Such buttons 33 can be installed on both handrails 32 in a specular position, that is, in the same direction of the entrance of the surface 11.

[0084] According to another variant shown in fig. 3a, with the purpose to allow users to stand on the surface of the structure 11 only where the brushes 13 are in operation and to permanently assure the washing of their footwear, both sides of the structure entrance are equipped with a bar 37, connected to a control button 38, which simultaneously operates the lifting bar 37 and the brushes 13.

[0085] The bar at the end of the surface of the structure 11 can be lifted along with the bar 37 located at its entrance, or else it can be interlocked with a stroke-end device which is connected to the sliding button 33 shown in fig. 1. The closing of the bars 37 is optimally implemented by presence detectors such as, for example, photocells or a similar device.

[0086] A further variant, not shown here, includes a photocell device at the entrance and exit of the floor-mounted structure which respectively operate and dis-operate the brushes 13 while the user is moving forward along the very structure.

## Claims

1. Floor-mounted device for the hygiene and brushing of footwear, particularly fit for food-processing plants, laboratories, hospitals, sport and skiing centers, hotels or exhibition halls, the device including a floor-mounted supporting structure (11) and a plurality of rotating brushes (13), having a substantially horizontal axis (13) linked to the engine mechanisms (14), which form a pass-way defining a direction for the user while moving forward along the structure, such floor-mounted structure (11) including longitudinal bars with nicks (12) and/or transversal bars (112a, 112b) for the clamping of the ends of the brushes (13), these brushes (13) being sprayed with the washing liquid, beneath the floor-mounted structure (11) there being located a supply tank (31) of such liquid, the device being characterized in that the brushes (13) are provided, at least at one of their ends, with quick-mounting/dismounting mechanisms that cooperate with the abovementioned longitudinal bars (12) and/or the transversal bars (112a, 112b).
2. Device as in Claim 1, being characterized in that one end of every brush (13) cooperates with a respective cogged wheel (23), which is kinematically connected by means of a driving wheel (24) to the engine mechanisms (14), the cogged wheels (23) of all the brushes (13) being kinematically interlocked one with the other.
3. Device as in Claim 1, being characterized in that the brushes (13) are arranged one parallel to the other and lined up crosswise to the direction of the user defined by the the pass-way surface.
4. Device as in Claim 1, being characterized in that the brushes (13) are at their respective ends clamped on the longitudinal bars with nicks (12), such ends including a coupling joint (17a, 17b) connected to rolling mechanisms (18a, 18b) embodied in the bars with nicks (12). Such a coupling joint (17a, 17b), including at least one section (117) arranged towards the brushes (13), has female gaps (19,21) to be coupled with the mating male mechanisms (20,22) that are obtained out of the shaft (15) of the brushes (13).
5. Device as in Claim 4, being characterized in that the brushes (13, 113) are clamped on the respective coupling joints (17a, 17b) by means of screws.
6. Device as in Claim 4, being characterized in that the brushes (13, 113) are clamped on the respective coupling joints (17a, 17b) through a mating mechanism.
7. Device as in Claim 1, being characterized in that the brushes are arranged longitudinally to the direction of the user defined by the pass-way surface.
8. Device as in Claim 7, being characterized in that the brushes (13) are parallel and lined up one after the other, thus forming a substantially horizontal pass-way surface.
9. Device as in Claim 7, being characterized in that the brushes (13) are one staggered from the other on the horizontal surface.
10. Device as in Claim 7, being characterized in that it includes, on at least one side of the pass-way surface, not fewer than two brushes (13) arranged one upon the other in order to define a pass-way corridor (43) for the cleaning of the footwear bootlegs.
11. Device as in any of the Claims hereinbefore, being characterized in that the brush comprises a hollow roll (15) projecting peripherally the bristles (16) which is coaxially mortised, thus being axially extractable, on a rotation shaft (42) that is embodied in the respective cogged wheel (23).
12. Device as in Claim 11, characterized in that the brushes include one first end linked with the respective cogged wheel (23) and a second end clamped and embodied in the respective transversal bar (112a), such transversal bar (112a) being capable of upward rotation in order to bring all the brushes (13) from a horizontal working position to a position inclined towards above that allows the axial extraction of the hollow roll (15) out of its respective rotation shaft (42).
13. Device as in any of the Claims hereinbefore, being characterized in that the engine (14) is reversing.
14. Device as in any of the Claims hereinbefore, being characterized in that the washing liquid is delivered by means of pipings (27) in contact with the pass-way surface formed by the brushes (13, 113) lying on it and a supply/adjustment control unit (28).
15. Device as in Claim 14, being characterized in that the supply and adjustment unit (28) has vibrating diaphragm means interlocked with the engine (14) defining the pressure of the washing liquid delivery.
16. Device as in Claim 14, being characterized in that the supply and adjustment control unit (28) is equipped with a venturi dispenser.
17. Device as in any of the Claims hereinbefore, being characterized in that the sides of the supporting structure (11) include at least one handrail (32) on

which a start-stop button (33) is mounted.

18. Device as in any of the Claim 17, being characterized in that the button (33) can slide along the hand-rail (32) from its initial position at the entrance of the supporting structure (11) to the final position at its exit, such button being (33) connected to a return-stroke system (36). 5
19. Device as in any of the Claims hereinbefore, being characterized in that a special device (37) is included to hinder the access to the pass-way surface (11) interlocked with the control system (38) that also operates the brushes. 10
20. Device as in any of the Claims hereinbefore, being characterized in that it includes a photocell device located at the entrance and/or exit of the floor-mounted structure (11) fit to respectively operate/disoperate the engine (14) for the rotation of the brushes whenever the user's transit is detected. 15 20
21. Device as in any of the Claims hereinbefore, characterized in that it includes at least one brush (113) having a vertical rotation axis. 25

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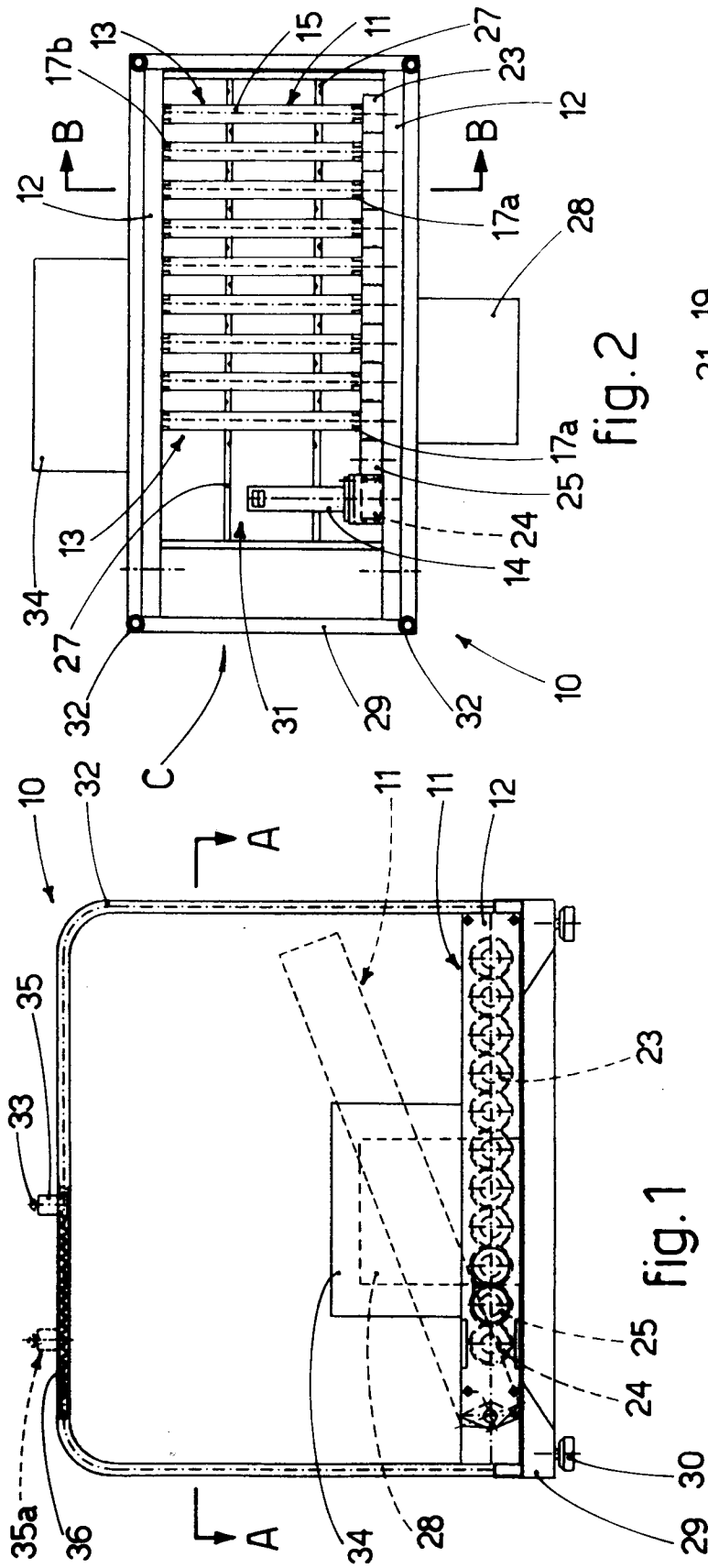


fig. 2

fig. 1

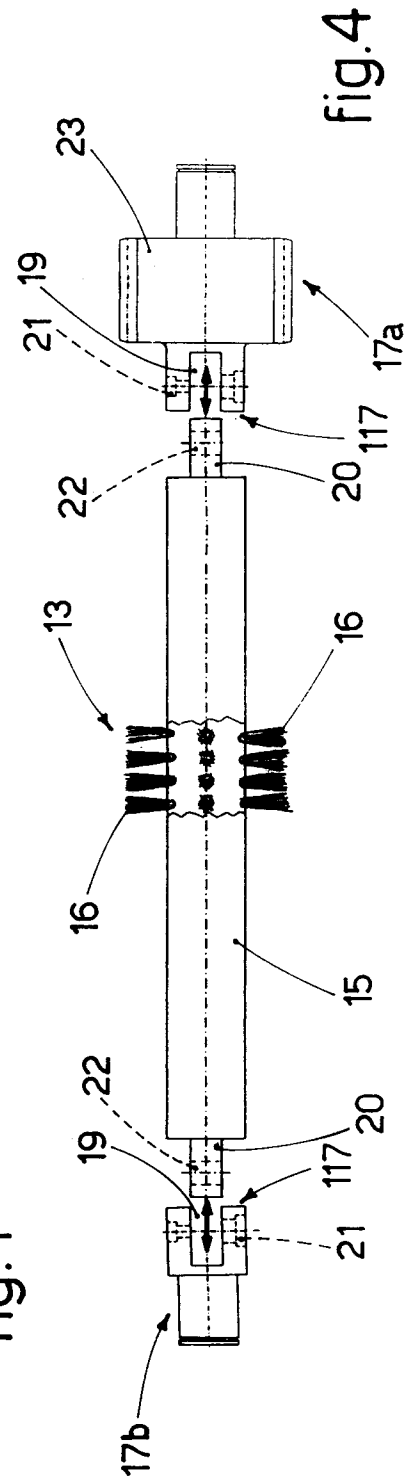
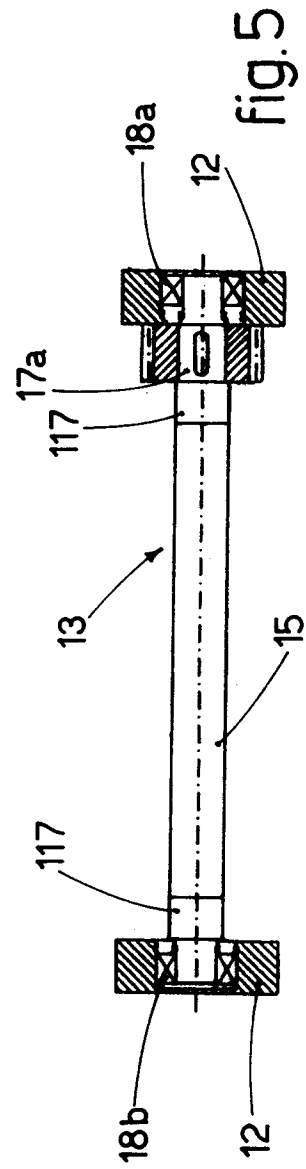
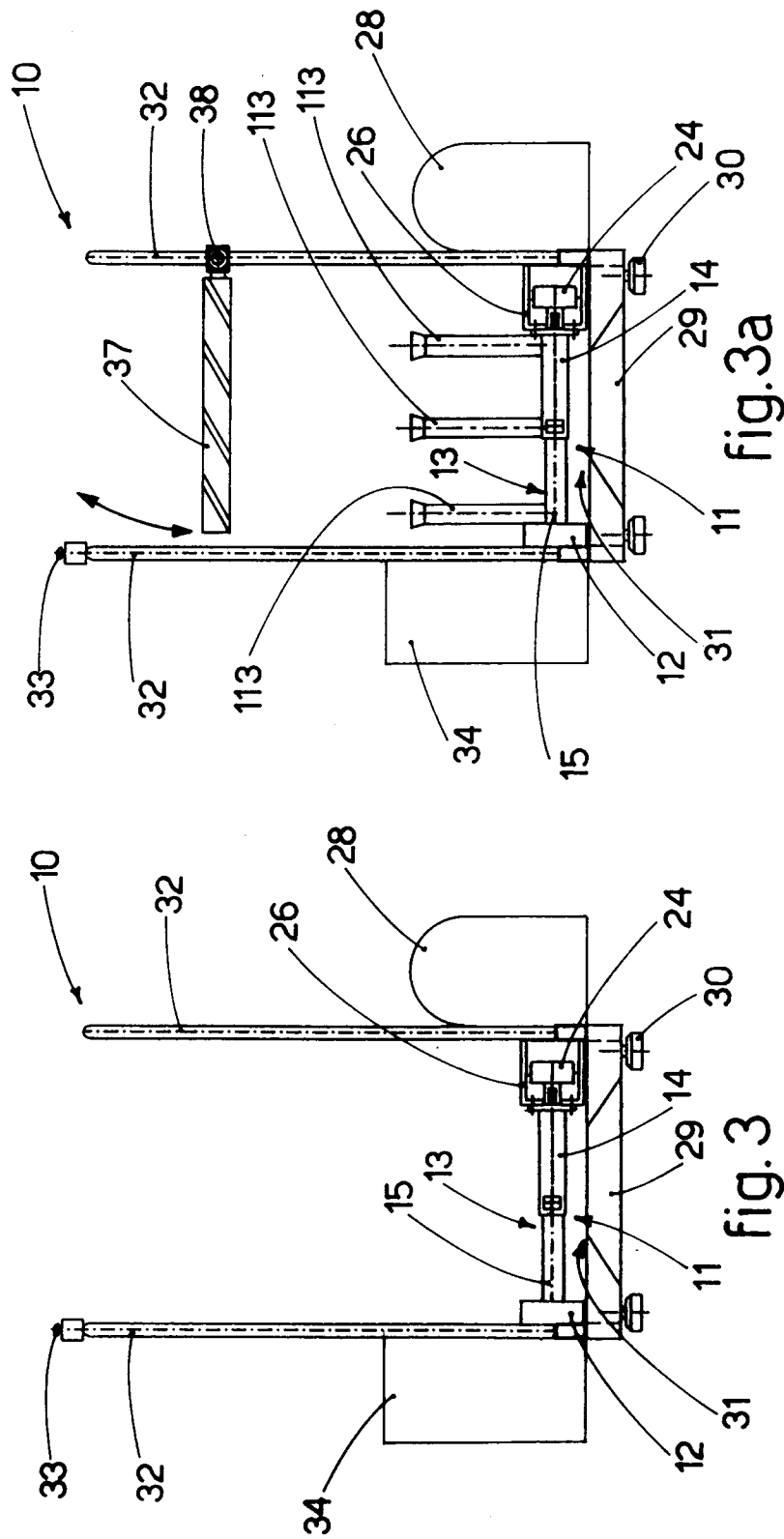
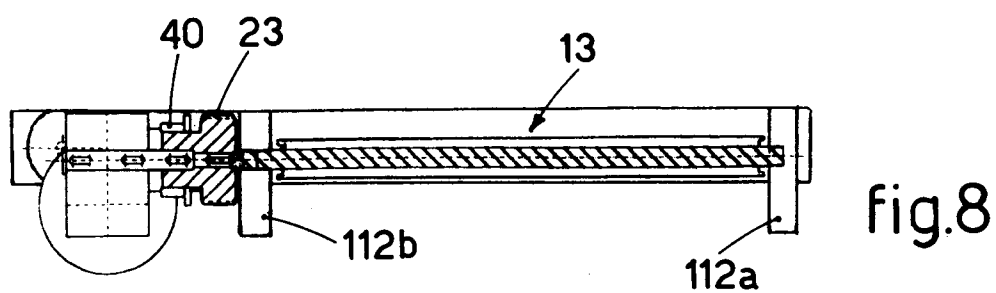
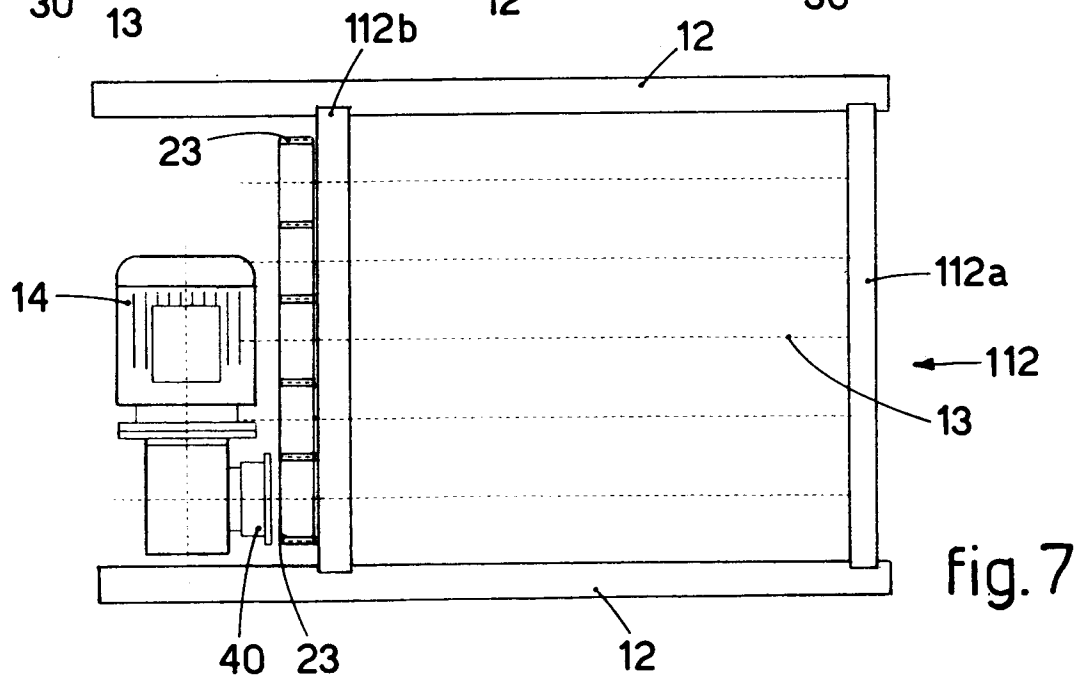
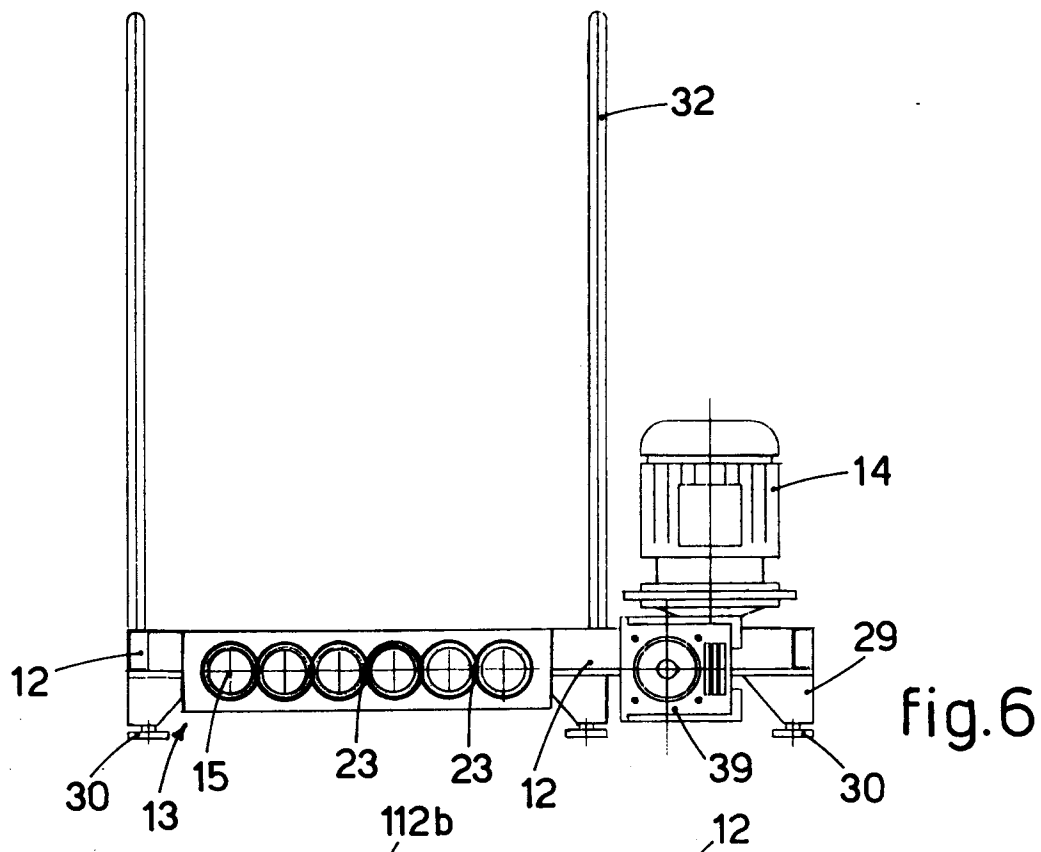


fig. 4





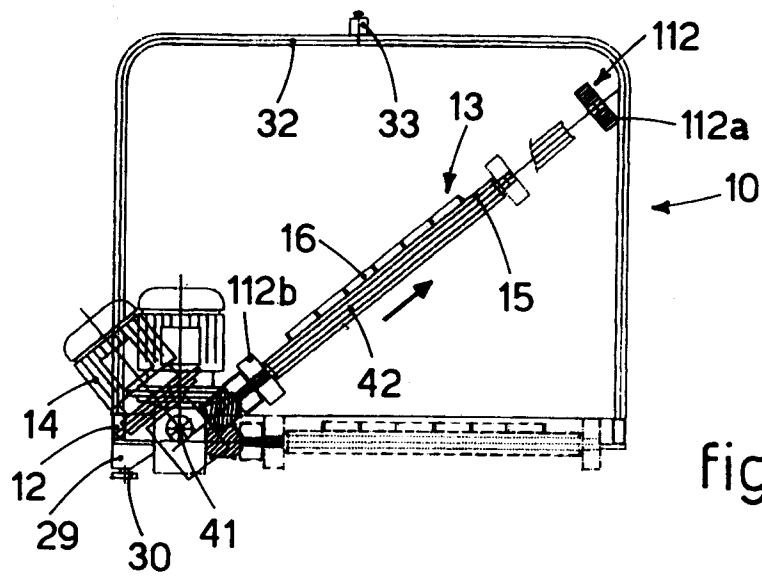


fig.9

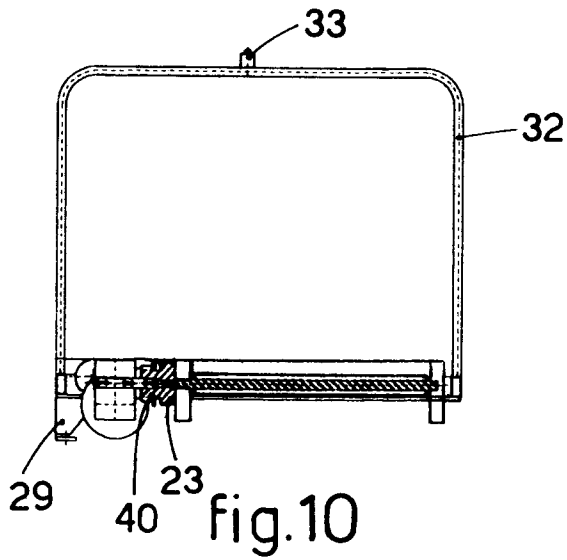


fig.10

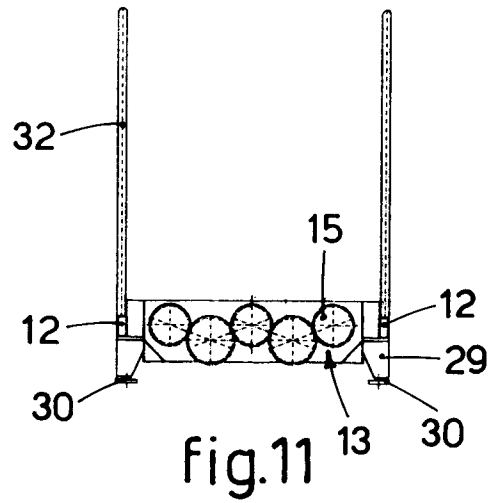


fig.11

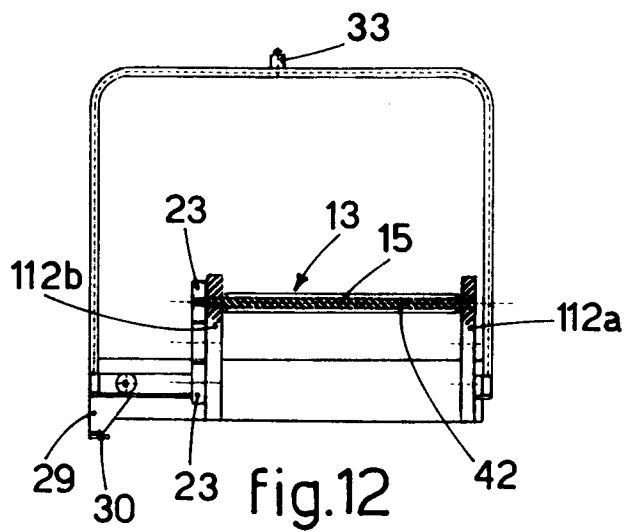


fig.12

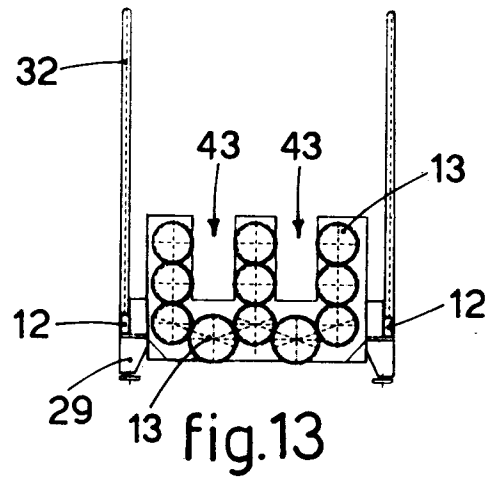


fig.13



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 99 10 3033

| 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.6) |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | DE 40 24 613 A (SCHMID EGON ;SCHMID ARMIN (DE)) 6 February 1992<br><br>* column 3, line 2 - column 4, line 38;<br>figures 1-3 *<br>--- | 1-4,<br>6-10,17,<br>21                                 | A47L23/02                                    |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | DE 296 18 216 U (ITEC INGENIEURBUERO FUER HYGIE) 23 January 1997<br><br>* page 3, line 13-20 *<br>---                                  | 1-4,<br>6-10,17,<br>21                                 |                                              |
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| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                        |                                                        |                                              |
| Place of search<br><b>MUNICH</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                        | Date of completion of the search<br><b>20 May 1999</b> | Examiner<br><b>Laue, F</b>                   |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone<br/>Y : particularly relevant if combined with another document of the same category<br/>A : technological background<br/>O : non-written disclosure<br/>P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>E : earlier patent document, but published on, or after the filing date<br/>D : document cited in the application<br/>L : document cited for other reasons<br/>.....<br/>&amp; : member of the same patent family, corresponding document</p> |                                                                                                                                        |                                                        |                                              |

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

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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  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

20-05-1999

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