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(54) Cleaning tool

(57) Accessory tool for use with a high-pressure cleaner for cleaning surfaces, in particular paved surfaces, having a housing (10) in which a rotor (30) comprising a laterally directed arm (32) is received. The arm is provided with an outlet nozzle (34) for ejecting high-pressure cleaning fluid. The cleaning fluid is discharged in a circular pattern to the open side of the housing towards the surface to be cleaned. The open side of the housing has a triangular shape.

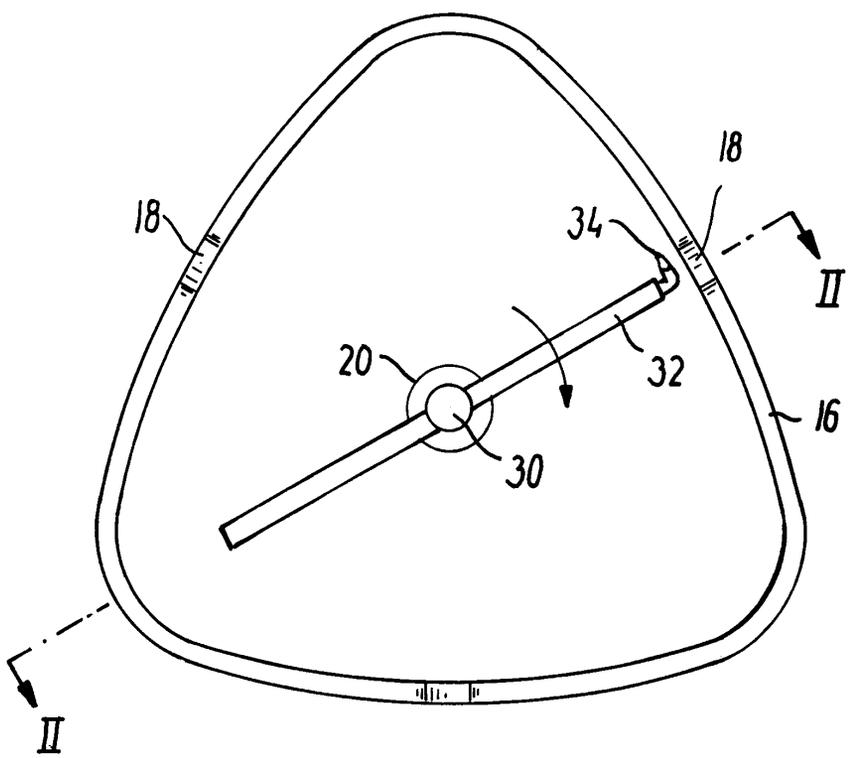

FIG.1

EP 1 027 854 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to an accessory tool for use with a high-pressure cleaner for cleaning surfaces, in particular paved surfaces as set forth in the preamble of claim 1.

BACKGROUND ART

[0002] A tool of this kind is disclosed in US-A-3,748,050. In this disclosure is described a tool for use with a high-pressure cleaner discharging a generally circular pattern of cleaning fluid towards a surface or object to be cleaned. The tool has a housing having a peripheral flange terminating in an edge surrounding an open side of the housing. A rotor received within the housing is adapted to receive the cleaning fluid from the high-pressure cleaner. The rotor comprises a pair of laterally directed tubular arms with nozzles secured to the ends of the arms that direct cleaning fluid under pressure towards the open side of the housing. In recent years, the use of domestic high-pressure cleaners has become popular. These high-pressure cleaners for domestic use have a relatively low power output. The tool as disclosed in US-3,748,050 is provided with a housing with an outer contour which is either a circle or a square. This contour is not convenient for reaching in corners, in particular in corners with an acute angle. Moreover upon hitting an obstacle the contours tend to bounce the tool back instead of allowing it to pass the object on the side.

DISCLOSURE OF THE INVENTION

[0003] On this background, it is the object of the present invention to provide an accessory tool for use with a high-pressure cleaner for cleaning surfaces, in particular paved surfaces, of the kind referred to initially, which overcomes the oabove-mentionned problems. This object is achieved in accordance with claim 1 by the contour of the housing (10) as defined by the peripheral wall (14) being triangular.

[0004] According to an embodument the contour of the housing is a curvilinear triangle.

[0005] According to another embodiment of the invention the contour of the housing is a spherical triangle.

[0006] The inlet conduit my be provided with a narrowing extending upstream from the transition from the inlet conduit to the transit conduit in the rotor causing the flow speed of the cleaning fluid at the transition to increase and the pressure of the cleaning fluid to decrease thereby reducing the sealing requirements.

[0007] The tool may be provided with a means for adjusting the distance between the at least one outlet nozzle and the surface to be cleaned.

[0008] The rotational movement of the rotor may be driven by the cleaning fluid leaving the outlet nozzle.

[0009] The tool may also hover above the surface to be cleaned carried by the reaction force of the cleaning fluid leaving the outlet nozzle.

[0010] The terminating edge of the housing may be provided with protuberances for improving the drainage of the cleaning fluid.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] In the following detailed portion of the present description, the invention will be explained in more detail with reference to the exemplary embodiments shown in the drawings, in which

Figure 1 is a view on top of the tool,
Figure 2 is a cross-sectional view on the side of the tool,
Figure 3 is a detail in section of the rotor/collar connection, and
Figure 4 is a detail in section of the rotor/collar connection of a second embodiment.

DETAILED DESCRIPTION OF THE INVENTION

[0012] The tool as shown in Figures 1 and 2 comprises a housing 10 having a top wall 12 which goes over into a peripheral wall 14 which terminates in an edge 16 surrounding an opening side of the housing. According to a preferred embodiment of the invention, the peripheral wall follows the contours of a curvilinear triangle, in particular a spherical triangle. The triangular contour allows the tool to pass objects by sliding along them instead of bouncing back and enables cleaning in corners with an acute angle. The tool is moved forwards by the operator with one of the corners of the triangular contour leading. The peripheral wall 14 extends downwardly from the top wall 12 and the edge 16 which forms the bottom edge of the tool is according to a preferred embodiment provided with protuberances 18 for the tool to rest on, thus leaving a clearance between the terminating edge 16 and the surface to be cleaned allowing the cleaning fluid to evacuate.

[0013] A rotor 30 is received within the pan-shaped housing 10. A collar 20 is attached to and extends through the centre of the top wall 12. The collar 20 is threaded on a support ring 22 which is fixed to the top wall of the housing. The collar 20 is secured against rotation with respect to the threaded support 22 by a locking nut 24. The rotor 30 is rotatably coupled to the collar 20. The rotor 30 comprises at least one outwardly directed tubular arm 32. According to a preferred embodiment, the rotor is provided with two oppositely directed tubular arms 32 which are attached to a hollow T-shaped connector piece 33. A downwardly directed nozzle 34 is secured to the end of the arm 32. The rotor 30 comprises a transit conduit adapted to carry cleaning fluid under pressure to the nozzle 34. The nozzle 34 has a discharge orifice to direct the cleaning fluid under pressure

through the open side of the housing to the surface to be cleaned. By providing only one sigle outlet nozzle the relatively low power as availble from a domestic high pressure cleaner is not split in two uneffective jet spays but instead used effeciently as a single and high impact jet spray.

As shown in Figure 1, the nozzle 34 is directed at an inclined angle, preferably about 7°, with respect to the rotation axis of the rotor 30 so that the reaction force on the nozzle, due to discharge of fluid under pressure from the nozzle, will turn the arm 32 in the direction of the arrow A shown in Figure 1, and thereby provide a revolving motion of the rotor, which is preferably in the range of 400 - 600 rpm. The cleaning fluid thus describes a circular pattern over the surface to be cleaned. The distance from the bottom edge 16 to the orifice of the nozzle 34 can be adjusted by rotation of the collar 20 within the threaded support 22. Thus, the cleaning effect of the tool can be adapted to the circumstances and the particular surface to be cleaned. The collar 20 defines a part of the inlet conduit. The inlet conduit receives the high-pressure cleaning fluid from the high-pressure cleaner. Hereto the collar 20 is connected via a swivel 26 to a quick coupling 28. The quick coupling 28 can be connected to the lance or the spray gun of the high-pressure cleaner. The inlet conduit 24 extends from the coupling 28 via the swivel 26 to the collar 20. The transit conduit extends in the rotor 30 from the inlet conduit to the outlet nozzle 34. The high-pressure cleaning fluid thus reaches the nozzle via the inlet conduit and thereafter the transit conduit.

[0014] Referring now to Figure 3, the collar 20 and the connection of the rotor 30 to the collar 20 are shown in detail in cross-section. In the collar 20 is provided a passageway 23. The rotary coupling between the rotor 30 and the collar 20 comprises an upper bearing bush 25 and a lower bearing bush 27 which are placed within the collar 20. The rotor extends through the lower bearing bush 27 and upwards into the upper bearing bush 25. The upper bearing bush 25 defines a through-passage 29 for passage of the cleaning fluid and for receiving the uppermost part of the rotor 30. The uppermost part of the rotor 30 is a sleeve 38 which fits tightly within the through-passage 29 of the upper bearing bush 25. The lower bearing bush 27 serves in combination with a flange 39 on the rotor 30 as an axial bearing. The cross-sectional area of the passageway 29 is significantly smaller than the cross-sectional area of the passageway 23 in the collar 20. The flow speed of the cleaning fluid in the narrow passageway 29 is therefore significantly higher than the flow speed of the cleaning fluid in the passageway 23 in the collar 20. The increased flow speed in the narrow through-passageway 29 results in accordance with Bernoulli's law in a lower pressure in the narrow through-passage 29 with respect to the pressure in the passageway 23. Accordingly, the sealing of the rotational connection can be achieved by a tight fit between the sleeve 38 and the passageway 29 in the upper bearing bush 25, without the need of additional resilient means.

[0015] Referring now to figure 4, the collar 20 and the connection of the rotor 30 to the collar 20 are shown in detail in cross-section in accordance with the second embodiment of the invention. The collar 20 is slideably received in the support 22. The supposurt houses a resilient latch 40 that engages the vertiacally spaced grooves 42 in the side surface of the collar 20. The latch 40 may provided with a handle (not shown) to diengage the latch in order to allow the collar 20 to be relocated with respect to the housing 10.

[0016] The rotary connection between the rotor 30 and the collar 20 does not necessarily have to include all the features as described in the above embodiment, i.e. the rotor does not necessarily have to extend into the narrow passageway 29. It is sufficient if a narrow passageway is provided just before the transition between the stationary part of the inlet conduit and the rotating part, i.e. the transit conduit.

[0017] For practicality a handle is attached to the housing 10. Further the swivel 26 allows the tool to adapt its angular position with respect to the spray gun. The height adjustment of the collar 20 does not necessarily have to be carried out as described above. Any conventional locking means that allow axial repositioning could be suitable.

LIST OF REFERENCE NUMERALS

[0018]

10	housing
12	top wall
14	peripheral wall
16	edge
18	protuberance
20	collar
22	threaded support
23	passageway
24	locking nut
25	upper bearing bush
26	swivel
27	lower bearing bush
28	coupling
29	narrow passageway
30	rotor
32	arm
33	T-shaped connector piece
34	nozzle
38	sleeve
39	flange
40	latch
42	groove

Claims

1. Accessory tool for use with a high-pressure cleaner for cleaning surfaces, in particular paved surfaces comprising

   - a housing (10) having a top wall (12) and a peripheral wall (14) terminating in an edge (16) surrounding an open side of the housing (10),
   - an inlet conduit for receiving high-pressure cleaning fluid,
   - a collar (20) secured to the top wall (12) of the housing (10) and forming part of the inlet conduit,
   - a rotor (30) received within the housing (10) rotatably coupled to the collar (20) and provided with at least one outlet nozzle (34) which is in fluid connection with said inlet conduit through a transit conduit in the rotor (30),

   characterised in that the contour of the housing (10) as defined by the peripheral wall (14) is triangular.

2. Accessory tool according to claim 1, **characterised** in that the contour of the housing (10) as defined by the peripheral wall (14) is a curvilinear triangle.

3. Accessory tool according to claim 2, **characterised** in that the contour of the housing (10) as defined by the peripheral wall (14) is a spherical triangle.

4. Accessory tool according to any of claims 1 to 3, **characterised** by comprising a means for adjusting the distance between the at least one outlet nozzle (34) and the surface to be cleaned.

5. Accessory tool according to claim 4, **characterised** in that the collar (20) is received relocatable in the housing (10).

6. Accessory tool according to claim 5, **characterised** in that the collar (20) is locked with respect to the housing (10) by a latching mechanism (40,42).

7. Accessory tool according to claim 5, **characterised** in that the collar (20) is threaded on the housing (10).

8. Accessory tool according to any of claims 1 to 7, **characterised** in that the inlet conduit has a narrowing extending upstream from the transition from the inlet conduit to the transit conduit in the rotor (30), causing the flow speed of the cleaning fluid at the transition to increase and the pressure of the cleaning fluid to decrease thereby reducing the sealing requirements.

9. Accessory tool according to any of claims 1 to 8, **characterised** in that the inlet conduit has a narrowing extending upstream from the transition form the inlet conduit to the transit conduit in the rotor, causing the flow speed of the cleaning fluid at the transition to increase and the pressure of the cleaning fluid to decrease thereby reducing the sealing requirements.

10. Accessory tool according to any of claims 1 to 9, **characterised** in that the transit conduit has a widening extending downstream from the transition from the transit conduit to the inlet conduit.

11. Accessory tool according to any of claims 1 to 10, **characterised** in that the cleaning fluid passing out of said at least one nozzle (34) being directed at an inclined angle with respect to the rotation axis of the rotor (30) thereby creates a reaction force on the at least one nozzle (34) that propels said rotor nozzle assembly about said axis of rotation.

12. Accessory tool according to claim 11, **characterised** in that the component of the reaction force parallel to the axis of rotation of the rotor (30) is sufficient to allow the tool to hover above the surface to be cleaned.

13. Accessory tool according to any of claims 1 to 12, **characterised** by comprising a coupling (28) suited for connection to the lance or the spray gun of a high pressure cleaner.

14. Accessory tool according to any of claims 1 to 13, **characterised** by comprising a swivel (26) between the coupling (28) and the collar (20).

15. Accessory tool according to any of claims 1 to 14, **characterised** in that the terminating edge (16) is provided with protuberances (18) for improving the drainage of the cleaning fluid.

16. Accessory tool according to any of claims 1 to 15, **characterised** in that the coupling (28) is placed close to the tool.

17. Accessory tool according to any of claims 1-16, **characterised** in that a corner of the triangular contour forms the front of the tool.

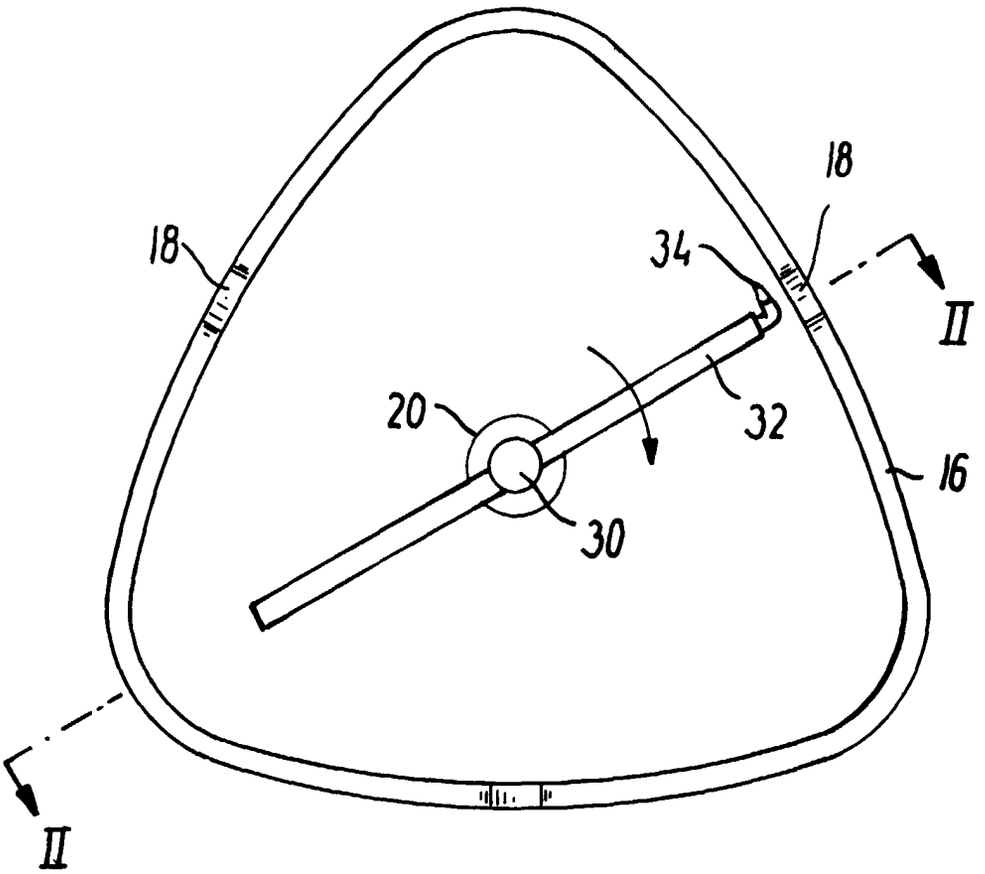

FIG.1

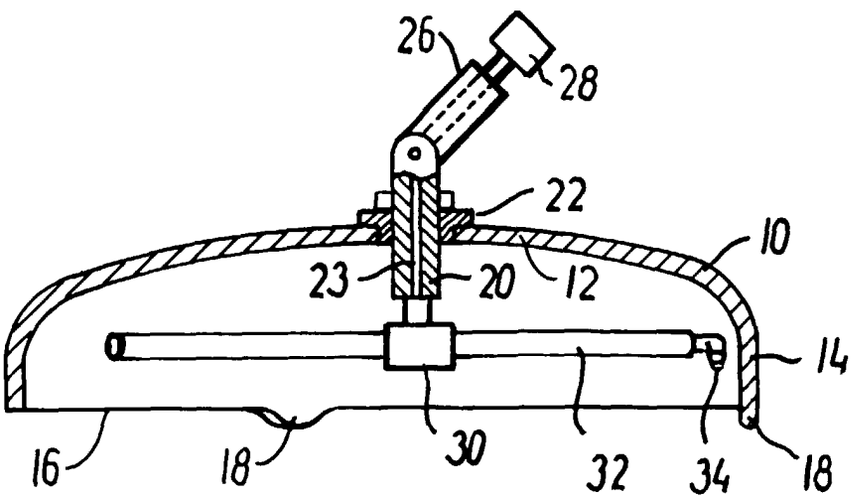

FIG.2

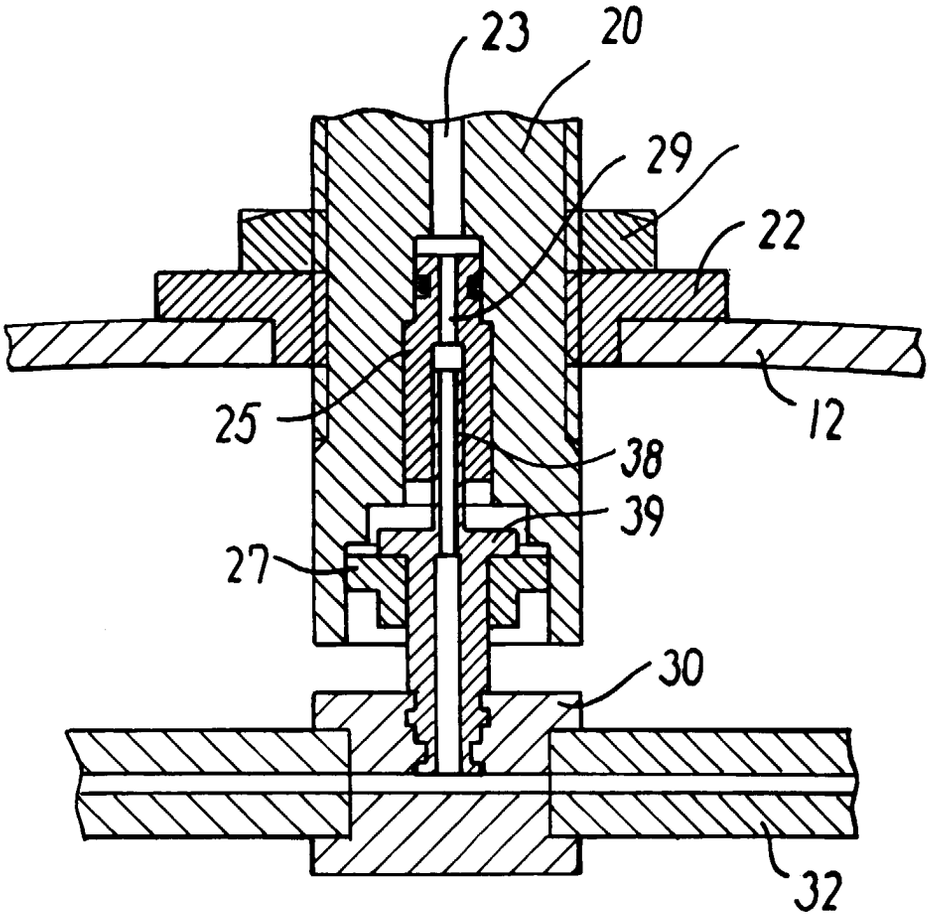

FIG. 3

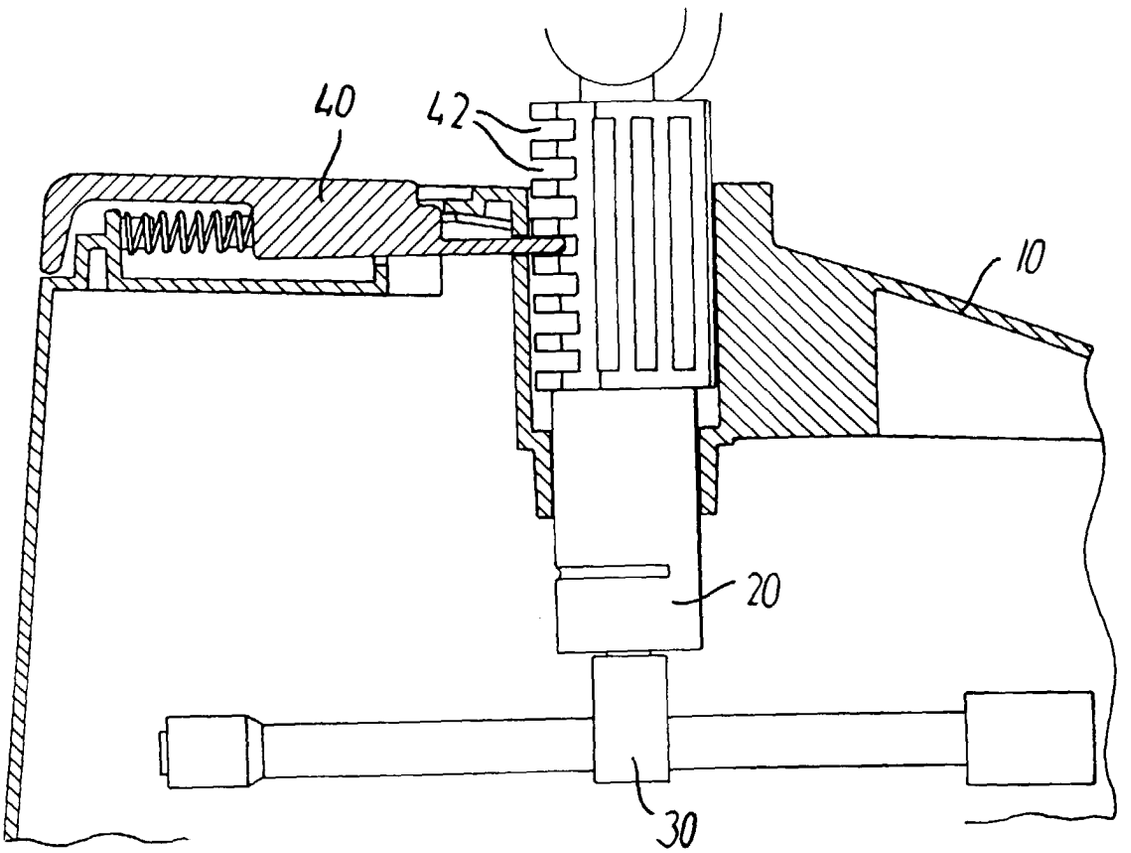

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 99 10 2497

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION
X	US 3 829 019 A (PETSCH H A) 13 August 1974 (1974-08-13) * abstract * * column 2, line 6 - line 39 * * column 3, line 5 - line 27 * * column 4, line 27 - column 5, line 3 * * figures 1-3,6 *	1,11,14, 16	A47L1/03 B05B3/06
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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	8 July 1999	Cabral Matos, A

CATEGORY OF CITED DOCUMENTS

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EUROPEAN SEARCH REPORT

Application Number
EP 99 10 2497

DOCUMENTS CONSIDERED TO BE RELEVANT

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TECHNICAL FIELDS SEARCHED

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	8 July 1999	Cabral Matos, A

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