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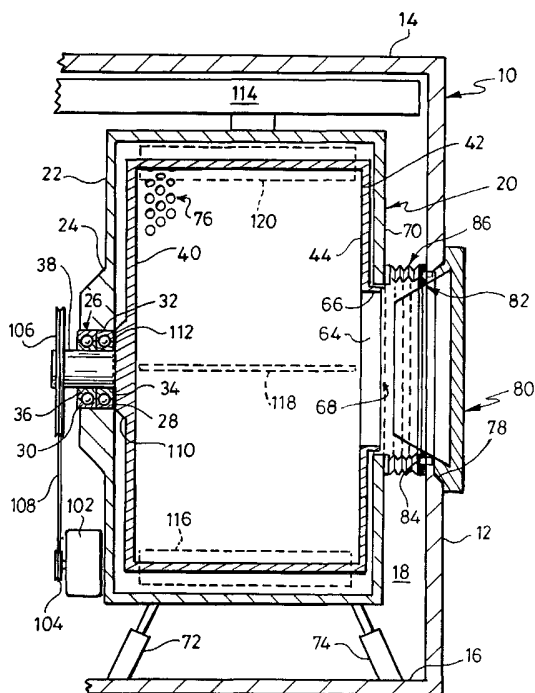
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[Continued on next page]

(54) Title: IMPROVEMENTS IN AND RELATING TO WASHING MACHINES



(57) Abstract: A washing machine wherein a drum-containing casing is supported within a cabinet so as to permit relative vibratory movement between the casing and the cabinet. The interior of the casing is sealed against loss of liquid and can accommodate an internal pressure above or below ambient. The support comprises resiliently extensible struts between the casing and the cabinet which generally centre the casing therewithin. A corrugated bellows surrounds and seals a circular opening in an end wall of the casing and at its other end a circular opening in an adjacent wall of the cabinet. The latter is closable by means of a door which seals to the opening therein. The corrugations are reinforced by at least one reinforcing helix or spiral in the form of a helical spring, which prevents the material forming the bellows sleeve from stretching or collapsing due to an increase or decrease in the pressure within the casing relative to ambient pressure outside the casing. The drum may be circular or pseudo-elliptical, when viewed axially. Water and detergent inlet ports, an air inlet port, an outlet port and a connection for a pressure gauge are located at a plurality of circularly spaced points around the cylindrical wall of the casing. Liquid can be supplied from a circulating pump which collects liquid from the housing and recirculates it under pressure preferably tangentially back into the housing. Incoming air is heated to 40°C. A heater is provided between the outer wall of the drum and the wall of the casing. An opening in the bellows supplies air to the casing during spin drying, or a diffuse mixture of water vapour and steam during washing. During drying air and water are drawn out of the casing by means of a suction pump (typically a

venturi pump) so that a pressure lower than ambient exists during drying. A positive pressure in the range 1 to 5 psi over ambient is maintained in the casing and the drum during washing. Blades are fitted to extend radially of the drum wall. Where they protrude externally of the drum they assist in distributing air and liquid and diffusing vapour within the casing. A second drum or basket can be fitted within the first.



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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## INTERNATIONAL SEARCH REPORT

International Application No

PC 02/03480

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 D06F37/22 D06F37/00 D06F37/26 D06F37/04 D06F39/00  
 D06F35/00 D06F39/08

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 D06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages                    | Relevant to claim No. |
|------------|-------------------------------------------------------------------------------------------------------|-----------------------|
| X          | GB 1 123 208 A (SUSPA-FEDERUNGSTECHNIK GMBH) 14 August 1968 (1968-08-14)<br>the whole document<br>--- | 1-6,8                 |
| X          | GB 1 179 018 A (G. BAUKNECHT GMBH) 28 January 1970 (1970-01-28)<br>the whole document<br>---          | 1,2,4-8               |
| X          | US 3 703 091 A (THE HOOVER COMPANY) 21 November 1972 (1972-11-21)<br>the whole document<br>---        | 1-6,8                 |
| X          | GB 1 270 950 A (GIRLING LIMITED) 19 April 1972 (1972-04-19)<br>the whole document<br>-----            | 1,2,4-8               |



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance  
 "E" earlier document but published on or after the international filing date  
 "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)  
 "O" document referring to an oral disclosure, use, exhibition or other means  
 "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

18 November 2002

Date of mailing of the international search report

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# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/GB 02/03480

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
  
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:  
1 - 8.

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-8

Washing machine tub with legs (claims 1-7) and method of supporting a tub (claim 8).

2. Claims: 9-14

Washing machine with stub shaft supported by a bearing

3. Claims: 15-22, 23-29, 59-61, 66

Washing machine with a sleeve

4. Claims: 30-34, 49-52, 65

Washing machine drum

5. Claims: 35-40

Washing machine tub with ports

6. Claims: 41-43

Washing machine heater

7. Claims: 44-46

Washing machine using a suction pump during drying

8. Claims: 47,48

Washing machine having a positive pressure during washing

9. Claims: 53-58

Washing machine with a second drum

10. Claims: 62-64

Reuse of water in a washing machine

## INTERNATIONAL SEARCH REPORT

patent family members

International Application No

PCT/GB 02/03480

| Patent document<br>cited in search report |   | Publication<br>date | Patent family<br>member(s)                                                                                                               | Publication<br>date                                                                                                        |
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| -----                                     |   |                     |                                                                                                                                          |                                                                                                                            |
| US 3703091                                | A | 21-11-1972          | NONE                                                                                                                                     |                                                                                                                            |
| -----                                     |   |                     |                                                                                                                                          |                                                                                                                            |
| GB 1270950                                | A | 19-04-1972          | NONE                                                                                                                                     |                                                                                                                            |
| -----                                     |   |                     |                                                                                                                                          |                                                                                                                            |