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(71) Applicant: **CREDA LIMITED**
Creda Works Blythe Bridge
Stoke-on-Trent Staffordshire, ST11 9LJ(GB)

(72) Inventor: **Stevens, Michael James**
7 Somerton Road Werrington
Stoke-onTrent Staffordshire ST9 0JH(GB)

(74) Representative: **Waters, Jeffrey et al**
GEC Patent Department (Chelmsford Office)
GEC-Marconi Research Centre West
Hanningfield Road
Great Baddow Chelmsford Essex CM2 8HN(GB)

(54) Laundry dryers.

(57) In a dryer or washer/dryer provided with a moisture sensing device comprising an electrode inside a drum in which the laundry is inserted, the electrode is connected via a passageway 13 which extends along a shaft on which the drum rotates to an annular contact 10 outside the drum which is coaxial with the shaft 4 and rotates with the shaft 4. A brush 11 bears against the contact, and the speed of relative movement between the brush and the contact is minimised since the diameter of the annular contact is also minimised. The annular contact may be mounted on the pulley 9 via which the drum is driven.

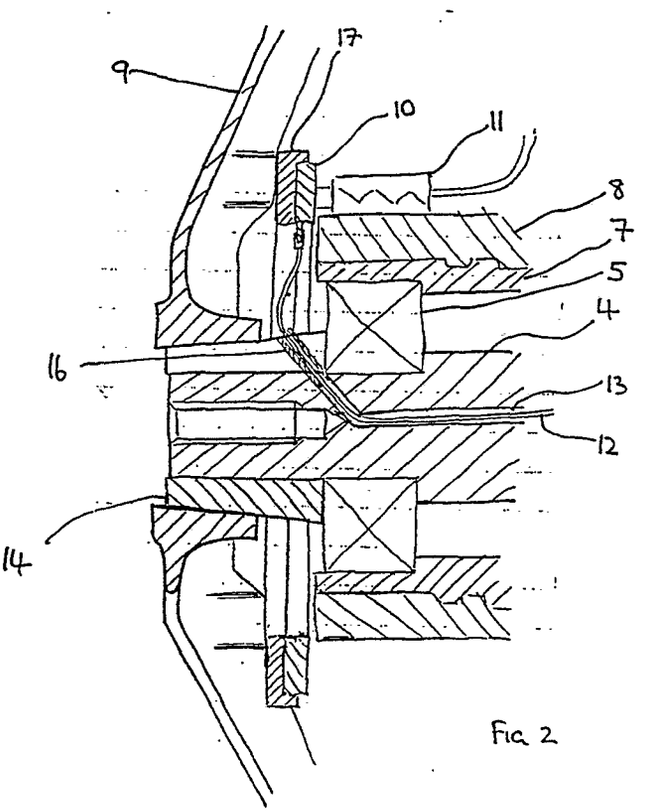

Fig. 2

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Laundry Dryers

This invention relates to laundry dryers, including washer/dryers.

In such dryers, the clothes are loaded into a drum, the walls of which are usually perforated, and which is rotatable within a tub. In the case of washer/dryers, water enters the tub and fills the drum to the level of water in the tub by passing through the perforations in the drum, and can similarly be drained from the drum and tub.

When the clothes are being dried, heated air is passed through the tub and hence the drum and, in order to avoid over-drying the clothes, a sensor may be provided to sense moisture. For example, the sensor may include a pair of electrodes in the drum (or one electrode using an uncoated metal drum as the other electrode), and moisture/dryness may be sensed by sensing the resistance between the electrodes.

In order to make contact with the electrodes, they may be connected to insulating areas inside the drum, and to leads extending through the drum wall, and brushes mounted on the cabinet may be pressed into contact with contact rings on the outside of the drum connected to the leads referred to. While such an arrangment works satisfactorily with a dryer which can be expected to rotate around 40 rpm, it is unsatisfactory for washer/dryer, which must have a spin facility and accordingly must be able to rotate at much higher speeds for example in excess of 800 rpm.

The invention provides a laundry dryer comprising a laundry drum having a shaft rotatable in a bearing, a moisture sensing device including an electrode inside the drum, an annular contact mounted outside the drum in such a way that it rotates with the drum and remains coaxial with the axis of the shaft in use, a brush urged against the contact, and a passageway which extends along the shaft and which opens at a position on the side of the bearing remote from the drum, to enable the electrode to be connected to the annular contact.

The passageway along the shaft enables the annular contact to be mounted in a convenient position outside the drum, and the speed of movement of the annular contact surface relative to the brush can be restricted by making the diameter of the annular contact sufficiently small.

The drum may be driven via a pulley mounted on a portion of the shaft on the side of the bearing remote from the drum, and the annular contact can conveniently be mounted on the pulley. In this case, the brush may be fixed relative to the bearing.

A washer/dryer constructed in accordance with the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a schematic view of the washer/dryer; and

Figure 2 is an axial cross-section through an end portion of the shaft of the drum of the dryer.

The washer/dryer has a horizontal drum 1 which is rotatable in a tub 2. The front 3 of the tub is closed by a pivotable door (not shown), and the motor for driving the drum, the mountings for the tub, and the cabinet are all not shown.

The drum is connected to a shaft 4 which is mounted in a pair of bearings 5, 6. The bearings are held in a bearing housing sleeve 7, which is in turn held in a sleeve 8 which extends from the tub.

The drum is driven by a means of a pulley 9, and performs the usual wash and spin dry functions. The drum may be arranged to rotate at speeds in excess of 1000 rpm for the spin phase of the program. In addition, when the load has been spin dried, heated air is circulated through the tub, moisture being condensed out of the closed circulation path. In order to prevent excessive drying of the clothes , the drum is provided with an electrode inside it, and a circuit for measuring the resistance between this electrode and the drum. When the resistance between the electrode and drum increases to a predetermined value. indicating that the moisture content of the load has reduced below a certain level, heating of the air circulated through the drum is stopped and, as the drying program has now been completed, rotation of the drum is also stopped.

Referring to Figure 2, the electrode within the drum is connected to the fixed control circuitry outside the drum in the following way, the body of the drum which is earthed via the bearings 5, 6. The electrode is connected to an annular contact 10 against which bears a brush 11, and a connection from the brush leads to the control circuit (not shown).

A lead 12 is connected to the electrode and extends along a passageway 13, which leads from the interior of the drum, along the axis of the shaft, and terminates in the circular wall of the shaft beyond the bearing 5.

The passageway 13 registers with the opening in a split tapered collar 14, which is pushed over the end of the shaft 4, and onto which is pushed the pulley 15, by means of which the shaft is driven. To prevent the lead 12 being torn if the collar is twisted when the pulley is driven, a steel tube 16 is inserted in interference fit in the mouth of the passageway 13. Other forms of key for the collar may be used.

The annular copper contact 10 is mounted on the pulley by means of several insulating pads 17. The fixed brush 11 is spring-biased against the contact 10, and is mounted on the sleeve 8 that extends from the tub.

It will be noted that the annular contact 10 rotates with the shaft 4, and remains coaxial with it. The speed of the sliding movement of the brush relative to the contact is minimised since the diameter of the annular contact 10 is relatively small, being little greater than the diameter of the bearing 5 itself. Consequently, the speed of relative movement is acceptable even when the drum is rotating in its spin-dry mode. Of course, the arrangement described is not restricted to washer/dryers having a spin function, and could also be used on dryers which do not have a spin function as well as dryers which do not have a wash function and merely have a drying function.

Claims

1. A laundry dryer comprising a laundry drum having a shaft rotatable in a bearing, a moisture sensing device including an electrode inside the drum, an annular contact mounted outside the drum in such a way that it rotates with the drum and remains coaxial with the axis of the shaft in use, a brush urged against the contact, and a passageway which extends along the shaft and which opens at a position on the side of the bearing remote from the drum, to enable the electrode to be connected to the annular contact.

2. A laundry dryer as claimed in claim 1, in which a pulley for driving the drum is mounted on a portion of the shaft on the side of the bearing remote from the drum, and the annular contact is mounted on the pulley.

3. A laundry dryer as claimed in claim 1 or claim 2, in which the brush is fixed relative to the bearing.

4. A laundry dryer as claimed in claim 2 or claim 3, in which the pulley is mounted on the shaft by means of a split collar, and the passageway opens at a position in register with the gap in the collar.

5. A laundry dryers as claimed in any one of claims 1 to 4, in which the moisture sensing device is arranged to sense the electrical resistance between the electrode and the drum.

6. A laundry dryer substantially as herein described with reference to the accompanying drawings.

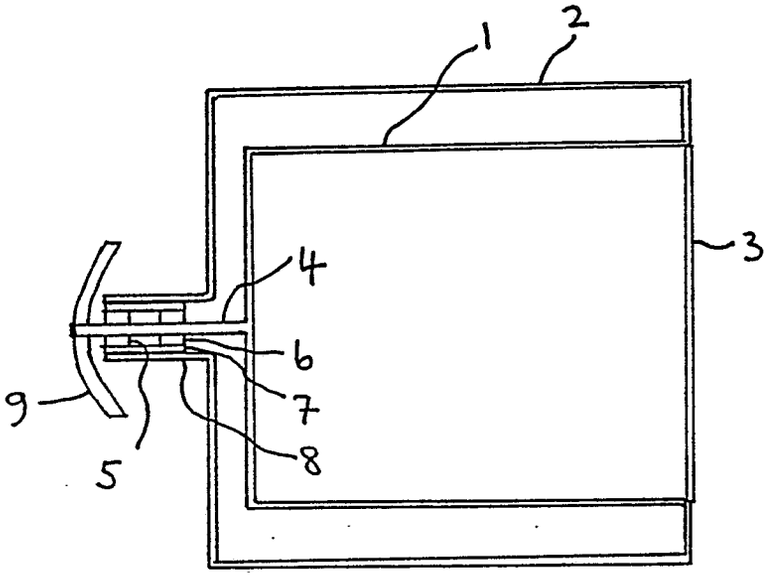

Fig 1

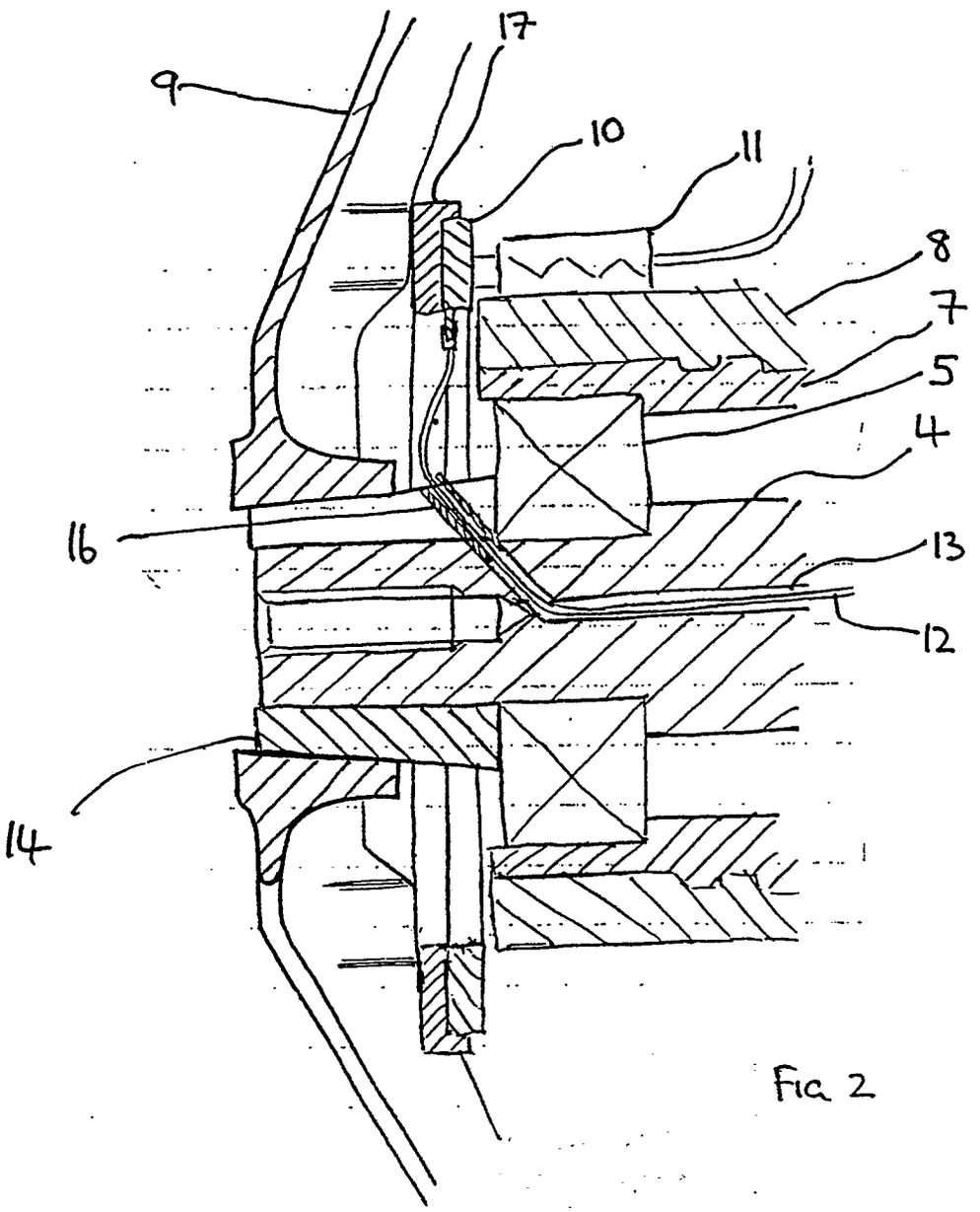

Fig 2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 30 8092

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)
X	US-A-3281953 (F.F.MUELLER ET AL) * column 5, line 3 - column 6, line 34 *	1, 3, 5	D06F58/04 D06F58/28
A		2	
X	US-A-3318015 (M.F.METZGER) * column 2, line 58 - column 3, line 12; figure 1 *	1, 3	
A		5	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 JANUARY 1990	GOODALL C.J.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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O : non-written disclosure
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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