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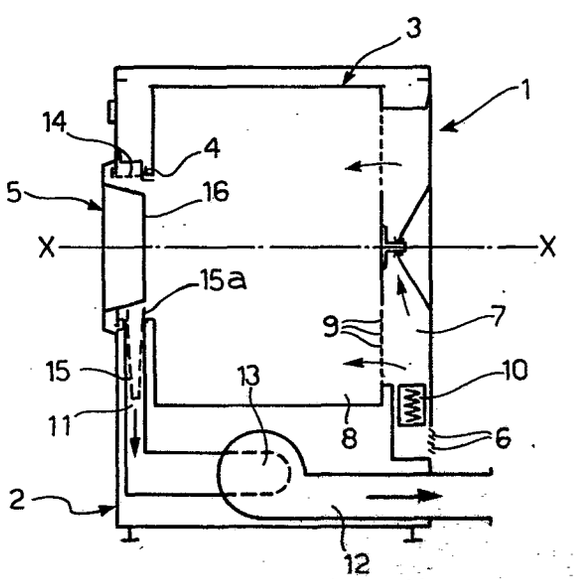
(54) Laundry drying machine.

(57) A rotary drum laundry drying machine for domestic use comprises a support casing (2), a cylindrical drum (3) mounted for rotation about its axis (X–X) within the support casing (2), means for rotatably driving the rotary drum (3), means (6, 7, 9, 10, 13) for supplying a flow of hot air to the interior of the rotary drum (3) at one end thereof, means for discharging the air from the rotary drum at the end thereof opposite the air supply end, and filtering means for filtering the air leaving the rotary drum including a main perforated filtering wall (14) facing into the interior (8) of the rotary drum (3) whereby, in operation, the laundry comes into contact with this wall removing therefrom the filtered out material. The filtering means further include an auxiliary perforated filtering wall (15) disposed so as to be traversed in parallel with the main perforated filtering wall (14) by the air leaving the rotary drum (3). This auxiliary perforated filtering wall (15) is situated in a position which cannot be reached by the laundry whereby it collects the material which has been filtered out by the main filtering wall and subsequently removed therefrom by the laundry during the drying cycle.



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"Laundry drying machine

The present invention relates to a rotary-drum laundry-drying machine for domestic use, of the type including:

a support casing,

a cylindrical drum mounted for rotation about its axis within the support casing and having a loading opening for the laundry situated in correspondence with a door with which the support casing is provided,

means for rotatably driving the rotary drum,

means for supplying a flow of hot air to the interior of the rotary drum at one end thereof,

means for discharging the air from the rotary drum at the end thereof opposite the end to which the air is supplied,

filtering means for filtering the air leaving the rotary drum, including a perforated filtering wall facing the interior of the rotary drum, whereby, in operation, the laundry contacts this wall removing therefrom the filtered out material.

A laundry-drying machine of the type specified above is described and illustrated in German Utility Model No. 71 17 075. The perforated filtering wall with which this machine is provided is able to retain the fluff which forms within the rotary drum during the drying cycle, preventing its discharge to the external environment. At the same time, the rubbing of the

laundry on this perforated filtering wall during the drying cycle prevents this filtering part from becoming covered with fluff and the air flow therethrough being reduced. This would in fact cause an increase in the time needed for the drying cycle, an increase in the working temperature of the machine and, in conclusion, a reduction in the drying efficiency and an increase in the energy consumption.

However, in the laundry drying machine described and illustrated in the German Utility Model cited above, the fluff removed from the perforated filtering wall as a result of the contact of the laundry with this wall returns into circulation in the rotary drum whereby, during the drying cycle, it continues to be deposited on this wall reducing the efficiency of the cleaning action of the laundry. Moreover, when the dried laundry is removed from the machine at the end of the cycle it is covered with fluff.

The object of the present invention is to provide a laundry drying machine of the type specified above which allows the said disadvantages to be avoided.

In order to achieve this object, the invention provides a laundry drying machine of the type specified above, which is characterised in that the said filtering means further include an auxiliary perforated filtering wall disposed so as to be traversed in parallel with the main perforated filtering wall by the air leaving

the rotary drum, and in that this auxiliary perforated filtering wall is situated in a position which cannot be reached by the laundry, so as to collect the material which has been filtered out by the main filtering wall and subsequently removed therefrom by the laundry.

In operation, the fluff which forms during the drying cycle is deposited partly on the main perforated filtering wall and partly on the auxiliary perforated filtering wall.

The fluff which is deposited on the main perforated filtering wall is removed by the laundry within the rotary drum and is conveyed by the drying air flow towards the auxiliary perforated filtering wall, which is traversed by this flow in parallel with the main perforated filtering wall. Thus the main perforated filtering wall always remains clean, guaranteeing an air flow which is sufficient for efficient drying. At the same time, the auxiliary perforated filtering wall, which is situated in such a position that the laundry cannot come into contact with it, collects the fluff removed from the main perforated filtering wall preventing this fluff from re-entering into circulation in the rotary drum. As a result of this characteristic, therefore, during the drying cycle, the main perforated filtering wall remains constantly clean, and at the end of the cycle, the dried laundry removed from the machine is not covered with fluff.

Preferably the auxiliary perforated filtering wall is releasably mounted in the machine to facilitate its cleaning at the end of the cycle.

Further characteristics and advantages of the present invention will emerge from the description which follows with reference to the appended drawings, provided purely by way of non-limiting example, in which:

Figure 1 illustrates a schematic section, in side elevation, of a laundry-drying machine according to the present invention,

Figure 2 illustrates schematically a frontal section of the machine of Figure 1,

Figure 3 is a diagram which illustrates the operational characteristics of the machine of Figure 1, and

Figures 4 to 6 illustrate variants of Figure 1.

In the drawings, the parts common to the various embodiments of the machine according to the present invention have been indicated by the same reference numerals.

In Figure 1, a rotary drum laundry-drying machine for domestic use is generally indicated 1, the machine comprising a support casing 2 within which is rotatably mounted a cylindrical drum 3. The drum 3 has a laundry loading opening 4 situated in correspondence with a door 5, in the form of a porthole, with which the support casing 2 is provided.

The laundry-drying machine 1 is provided with means of a type known per se, not illustrated, for rotatably driving the rotary drum 3 about its axis (which is indicated by the line X-X of Figure 1).

In its wall opposite that provided with the door 5, the support casing 2 has a series of apertures 6 for drawing air into the interior of a passage 7. The passage 7 communicates with the interior cavity 8 of the rotary drum 3 through a series of perforations 9 formed in the back wall of the drum 3, that is, the wall opposite the loading opening 4.

An electrical heating resistance 10 is positioned in the passage 7.

The interior cavity 8 of the rotary drum 3 communicates through the loading opening 4 with a passage 11 connected to a duct 12 for discharging air from the machine. A suction fan 13 for causing forced circulation of air through the interior of the machine is disposed in the duct 12.

In correspondence with the loading opening 4 of the rotary drum 3, the machine is provided with filtering means operable to separate from the air leaving the rotary drum the particles of fluff which form during the drying cycle.

The said filtering means are constituted by a main

perforated filtering wall 14 and an auxiliary filtering wall 15.

The main filtering wall is constituted (see Figure 2) by a curved wall in the form of a C with its opening facing downwardly, coaxially surrounding the loading opening 4 of the rotary drum 3.

The door 5 with which the support casing 2 is provided has an internal, frusto-conical bell shape 16 such as to permit the laundry contained in the rotary drum 3 to come into contact with the wall 14 during the drying cycle.

The auxiliary filtering wall is constituted by a trap element located below the wall 14 and having an inlet mouth of rectangular form the two smaller sides of which are adjacent the ends of the curved wall 14. The trap element 15 is located within the duct 11 and is releasably fixed to the wall 14.

Preferably moreover the mouth of the trap element 15 is provided with transverse elements 15b arranged to prevent the penetration of the smaller items of laundry into the trap element 15 and usable for grasping the trap element 15 in order to extract it from the machine. In operation, the fluff which forms during the drying cycle is deposited partly on the perforated filtering wall 14 and partly in the trap element 15.

The fluff deposited on the wall 15 is removed from this latter by the action of the laundry itself, contained in the rotary drum 3, which, during the drying cycle, comes into contact with the wall 14. The fluff removed from the wall 14 is carried away into the trap element 15 by the flow of air which traverses the rotary drum 3. In this way the filtering wall 14 always remains clean and, since its effective area is much greater than that of the trap element 15, the filling of this latter with fluff does not significantly alter the rate of flow of drying air.

After each drying cycle the trap element 15 can be removed from the machine to be cleaned of fluff.

Figure 3 is a diagram in which the values of the air flow rate are plotted as a function of time for one drying cycle of the laundry-drying machine.

The line indicated A relates to a laundry-drying machine according to the invention, whilst the line indicated B relates to a laundry-drying machine of known type provided with a single filtering wall of cylindrical form positioned coaxially adjacent the loading aperture of the rotary drum of the machine. The time t_0 corresponds to the beginning of the drying cycle. The points in time when the drying cycles of the two laundry-drying machines used for the test are completed have been indicated t_A and t_B respectively.

Figure 3 shows that by using a machine of the known type the rate of flow of air progressively reduces during the course of the drying cycle. By using instead the machine according to the present invention the air flow remains substantially constant for the whole cycle. Thanks to this characteristic the time necessary to effect the drying cycle is reduced.

The single difference between the machine of Figure 1 and the machine illustrated in Figure 4 is that in this latter the main filtering wall is constituted by a disc 140 extending perpendicularly to the axis X-X of the rotary drum in correspondence with the door 5, the air which traverses the wall 140 being carried away in the duct 11a arranged in parallel with the duct 11.

In operation, the laundry contained in the rotary drum 3 comes into contact with the filtering wall 140 removing the fluff deposited on this latter and avoiding, in this way, a reduction in the rate of flow of air during the drying cycle. In this case also the trap element 15 collects the fluff removed from the wall 140 and can be taken out to be cleaned at the end of the cycle.

The machine illustrated in Figure 5 differs from the machine illustrated in Figure 4 by the fact that the main filtering wall is constituted by a cylindrical wall 18 disposed coaxially adjacent the loading aper-

ture 4 of the rotary drum 3, and by the fact that the auxiliary filtering wall is constituted by a perforated disc 19 arranged perpendicularly with respect to the axis X-X of the rotary drum 3 in correspondence with the door 5. A perforated spacer wall 20 is arranged over the door 5 to prevent the laundry contained in the rotary drum 3 from coming into contact with the perforated disc 19 during the course of the drying cycle. The perforations in the wall 20 are sufficiently wide to allow the fluff to pass through this wall.

In operation, the laundry comes into contact with the cylindrical wall 18 removing the fluff deposited on it. In this way the wall 18 constantly remains clean and the rate of flow of air is maintained substantially constant throughout the course of the drying cycle. The fluff removed by the action of the laundry from the cylindrical wall 18 is carried by the flow of air which traverses the rotary drum 3 onto the apertured disc 19 which, at the end of the cycle, can be removed to be cleaned.

The main difference between the laundry-drying machine illustrated in Figure 6 and the machine illustrated in the preceding Figures lies in the fact that in the case of Figure 6 the main filtering wall is constituted by a perforated disc 140 positioned, in correspondence with the door 5, perpendicularly with respect to the axis X-X of the machine. The auxiliary filtering wall is constituted, on the other hand,

by a cylindrical wall 18 disposed coaxially to the rotary drum 3 adjacent the loading aperture 4 of the rotary drum. The door 5 has a cylindrical wall adjacent the wall 18 so as to prevent, during operation, the laundry contained in the rotary drum 3 from coming into contact with the wall 18.

In operation the laundry comes into contact with the apertured disc 140 removing from this latter the fluff deposited on it. In this way the rate of flow of air remains substantially constant, whilst the fluff is carried by the flow of air which traverses the rotary drum, onto the auxiliary filtering wall 18 which can be cleaned at the end of the cycle after the door has been opened.

Naturally, the principle of the invention remaining the same, the details of construction and the embodiments may be varied widely with respect to those described and illustrated purely by way of example without thereby departing from the scope of the present invention.

CLAIMS

1. A rotary drum laundry-drying machine, comprising:

a support casing (2),

a cylindrical drum (3) mounted for rotation about its axis (X-X) within the support casing (2) and having a loading aperture (4) for the laundry situated in correspondence with a door (5) with which the support casing (2) is provided,

means for rotatably driving the rotary drum,

means (13, 10) for supplying a flow of hot air to the interior of the rotary drum (3) at one end thereof,

means for discharging air out from the rotary drum (3) at the end thereof which is opposite the end to which air is supplied,

filtering means for filtering the air leaving the rotary drum (3), including

a main perforated filtering wall (14, 140, 18) facing into the interior (8) of the rotary drum (3) so that, in operation, the laundry comes into contact with this wall removing from it the filtered out material,

characterised in that the said filtering means further include an auxiliary perforated filtering wall (15, 19, 18) disposed so as to be traversed in parallel with the main perforated filtering wall (14, 140, 18) by the air leaving the rotary drum (3) and in that the auxiliary perforated filtering wall (15, 18, 19) is situated in a position which cannot be reached by the laundry, so as to collect material

which has been filtered out by the main filtering wall and subsequently removed therefrom by the laundry.

2. Laundry drying machine according to Claim 1, characterised in that the said main filtering wall is constituted by a curved perforated wall (14) of substantially C-shape conformation with the opening facing downwardly, arranged coaxially adjacent the loading aperture (4) of the rotary drum (3) of the machine, and in that the said auxiliary filtering wall is constituted by a trap element (15) positioned below the said C-shaped wall (14) and having an inlet opening (15a) situated in correspondence with the opening of the C.

3. Laundry drying machine according to Claim 1, characterised in that the said main filtering wall is constituted by a perforated disc (140) arranged in correspondence with the loading aperture (4) of the rotary drum (3), perpendicularly with respect to the axis (X-X) of this latter, and in that the said auxiliary filtering wall is constituted by a trap element (15) arranged below the said perforated filtering disc (140).

4. Laundry drying machine according to Claim 1, characterised in that the said main filtering wall is constituted by a perforated cylindrical wall (18) coaxially surrounding the loading aperture (4) of the rotary drum (3) of the machine, and in that the said

auxiliary filtering wall is constituted by a perforated disc (19) extending perpendicularly with respect to the axis (X-X) of the rotary drum (3), the said machine further comprising a perforated spacer wall (20) interposed between the said perforated filtering disc (19) and the interior cavity (8) of the rotary drum (3).

5. Laundry drying machine according to Claim 1, characterised in that the said main filtering wall is constituted by a perforated filtering disc (140) arranged adjacent the loading aperture (4) of the rotary drum (3), perpendicularly with respect to the axis (X-X) of this latter, and in that the said auxiliary filtering wall is constituted by a perforated cylindrical wall (18) coaxially surrounding the loading aperture (4) of the rotary drum (3).

FIG. 1

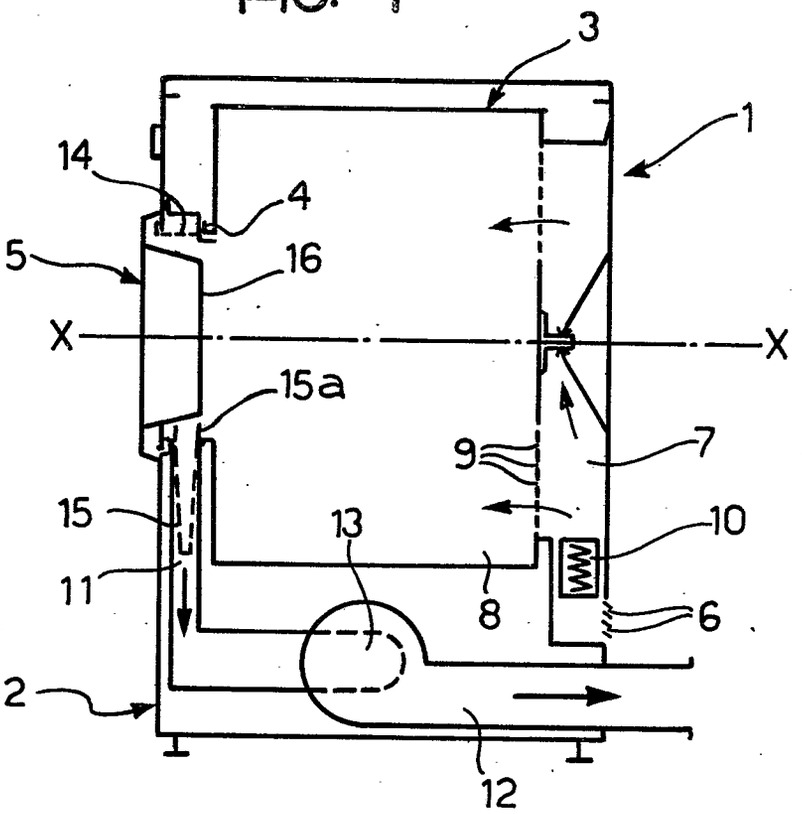


FIG. 2

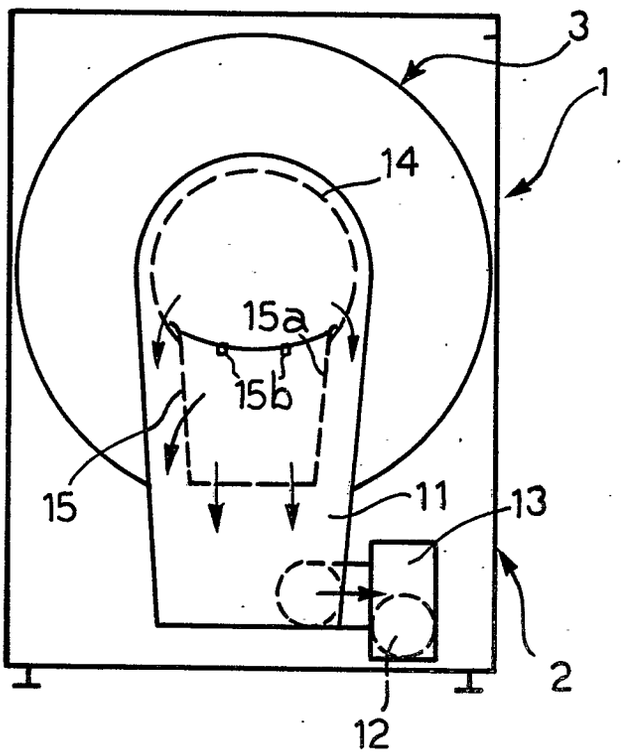


FIG. 3

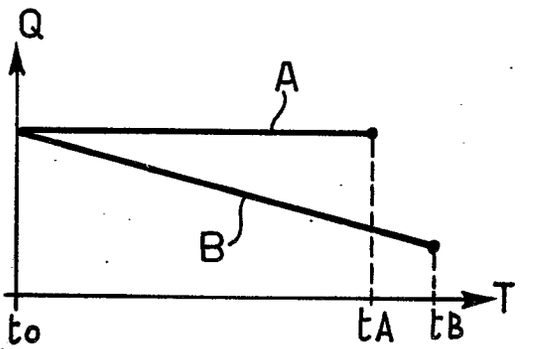


FIG. 4

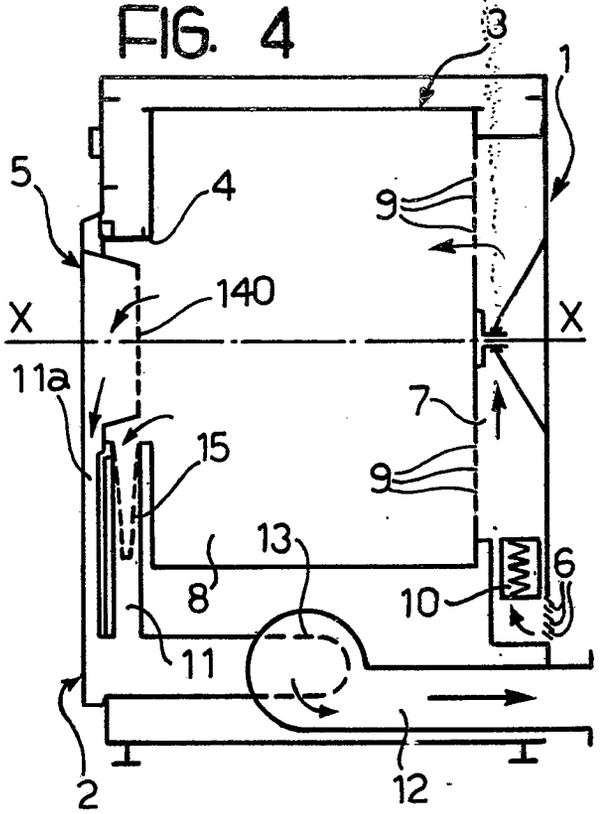


FIG. 5

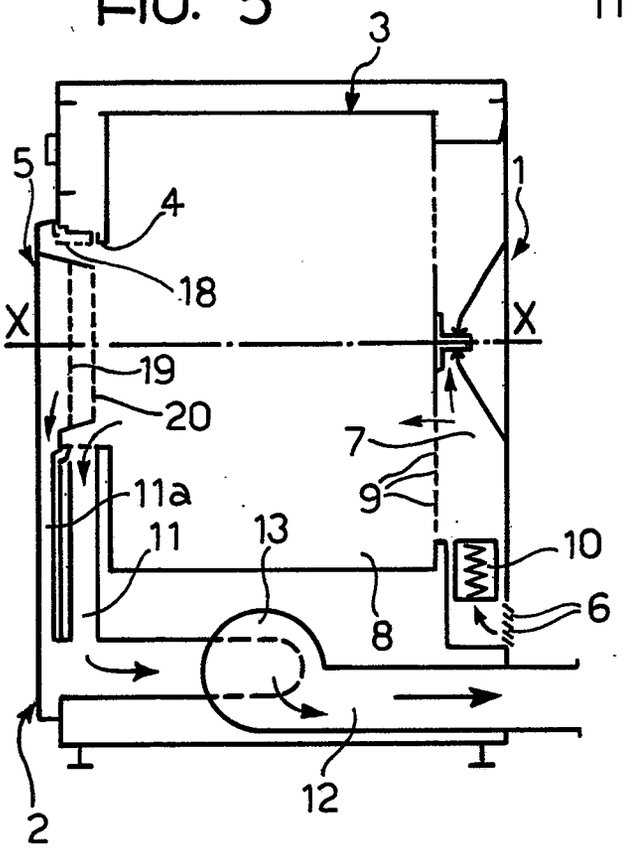
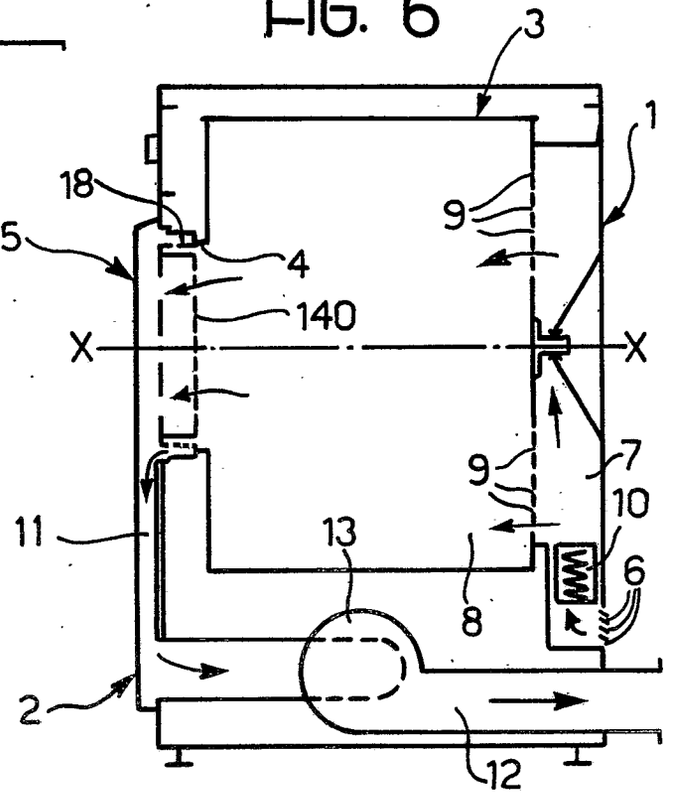


FIG. 6



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EUROPEAN SEARCH REPORT

0045288

Application number

EP 81 83 0133

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
AD	DE - U - 7 117 075 (SIEMENS) * Page 2, lines 1-15 *	1
A	DE - A - 2 214 619 (SIEMENS) * Page 1, line 20 - end; page 2, lines 1-20 *	1,2
A	PRODUCT LICENSING INDEX, July 1969 Havant, G.B. "Tumbler dryer", page 25 * Whole document *	1
A	DE - A - 1 957 844 (MEYER) * Page 4; page 5, first line *	1
A	US - A - 2 886 900 (FLANNERY) * Figures *	1
A	DE - U - 7 117 465 (SIEMENS) * Abstract *	1
A	US - A - 3 320 683 (WORST) * Column 3, lines 40-46 *	3

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

D 06 F 58/22

TECHNICAL FIELDS SEARCHED (Int. Cl.³)

D 06 F

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	06-11-1981	D'HULSTER

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