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(12) # EUROPEAN PATENT APPLICATION

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(54) **Condensation laundry drying machine.**

(57) In a laundry dryer with a closure window (9) acting as a receptacle (26) for collecting the condensate, the condenser (21) is mounted in the upper part of the machine at a level above that of the condensate collecting receptacle (26) and is connected thereto by a simple conduit (28) provided with valve means known per se. The condenser, the receptacle and other components are readily accessible for maintenance, and there is no need for a pump or the like for lifting the condensate from a lower to a higher area.

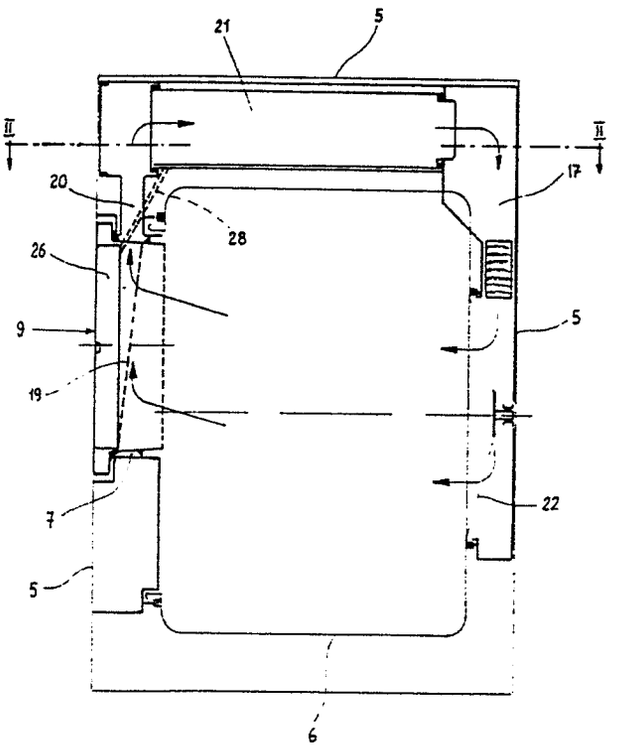

FIG. 1

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Condensation Laundry Drying Machine

The present invention relates to a condensation laundry dryer, particularly of the front-loading type for domestic use, in which the relative position of a condensate collecting receptacle and an air-cooled condenser apparatus, both of which are removable mounted in the interior of the machine, have been advantageously modified with respect to the known arrangement.

In laundry dryers of the type defined above, the heated air after having passed through the drum containing the laundry is dehumidified in a condenser cooled by ambient air which is removably mounted in the machine so as to facilitate its periodic inspection and cleaning by user.

The obtained condensate is collected in a receptacle likewise removably mounted in the machine for permitting it to be emptied as required by the user.

A simple solution permitting the condensed water to be collected by natural gravity flow is described in German Patent No. 2,923,701.

This known arrangement, however, renders the operations for the maintenance of the condenser and the removal of the collecting receptacle rather cumbersome, because these components are disposed closely above the ground.

In addition, as the removal and extraction of the collecting receptacle has to be carried out with the receptacle open on top, there occur frequent and undesirable spillages of the liquid from the receptacle.

Also known are laundry dryers which to the purpose of facilitating the various operations during use are provided with a condensate collecting receptacle mounted at an upper portion of the machine as described for instance in German Patent Application 32 04 396.

With an arrangement of this kind the construction of the machine is considerably complicated by the inclusion of a pump and a conduit for lifting the condensate water flowing from the condensator at the bottom portion of the machine to the collecting receptacle mounted in the top portion thereof. It would by contrast be advantageous to accommodate both the condenser and the collecting receptacle at locations readily accessible for the user without such complications in the construction of the machine.

Italian Utility Model No. 195,977 offers a more rational utilization of the internal space of a condenser laundry dryer by the employ of a closure door or window additionally acting as a receptacle for collecting the condensate.

The present invention has for its object to combine the advantages of this particular construction of the condensate collecting recptacle with an arrangement of the condenser permitting the complicated and expensive liquid collecting devices such as pumps and conduits of known solutions to be eliminated to thereby facilitate the operation and maintenance of the laundry dryer.

These and other objects are attained according to the invention in a condenser laundry dryer, particularly of the front-loading type for domestic use, comprising a closed circuit for the circulation of heated drying air through at least one heater element, a drum containing the laundry, and a removable mounted condenser apparatus connected to a condensate collecting receptacle likewise removably supported in the closure window of the machine and an open air circuit for cooling the condenser apparatus, wherein said condenser apparatus is accommodated in an upper portion of teh machine at a higher level than said condensate collecting receptacle and is connected to said receptacle by means of a conduit and per se known valve means.

The advantages and characteristics of the invention will become more clearly evident from the following description given by way of example with reference to the accompanying drawings, wherein:

fig. shown a longitudinal sectional view of a laundry dryer according to the invention,

fig. 2 shows a cross-sectional view taken along the line II-II in fig. 1, and

fig. 3 shows a front view of the laundry dryer according to the invention.

A condenser laundry dryer comprises an outer housing 5 with a drum 6 for containing the laundry mounted therein for rotation about a horizontal axis.

Housing 5 has a front opening 7 in alignment with the loading opening 8 of drum 6 and adapted to be closed by a closure door or window 9 as described in applicant's Italian Utility Model No. 195,977.

Drum 6 is adapted to be rotated by a motor 10 mounted in the top portion of the machine with the interposition of a friction roller 11 made of a resilient high-fraction material such as rubber. As an alternative, friction roller 11 may be replaced by a gear adapted to cooperate with a corresponding annular rack on the cylindrical peripheral wall of drum 6.

Otherwise drum 6 may also be rotated with the aid of a conventional belt transmission.

Friciton roller 11 itself is rotated about its shaft 12 secured to a shield 13 of motor 10 by a drive wheel 14 secured to the motor shaft 15.

The drying apparatus proper of the machine comprises a blower 16 (fig. 2) for the forced circulation of drying air in a closed circuit including an outlet passage 17 housing electric elements 18 for heating the air, drum 6 containing the moist laundry, an internal portion of window 9 provided with a fluff filter 19, a riser conduit 20 and finally the ambient-air cooled condenser 21.

For enabling the drying air to be circulated through the laundry, drum 6 of the machine is provided with a perforate rear wall 22 in the known manner.

The components defining the circulation path of the drying air within the machine are of course provided with any known sealing means which need not be described in detail.

The open circuit for cooling condenser 21 comprises a blower 23 for aspirating ambient air through an opening 24 and directing it through condenser 21 to finally expel it from the machine through another opening 25.

According to the invention, condenser 21 is positioned in an upper portion of the machine above drum 6 so as to permit the condensate, i.e. water produced by condenser 21 to flow by gravity into a collector receptacle 26 in window 9.

To this purpose a bottom wall 27 of a housing of condenser 21 is formed so as to direct the condensed water into a conduit 28 communicating with collector receptacle 26 in window 9 through known valve means already described in the above mentioned utility model no 195,977.

In the laundry drying machine described, all of the functional elements for the circulation and treatment of the drying air and for rotating drum 6 as well as the various electrical components and associated connecting circuitry are positioned in the upper part of the machine.

This arrangement is conducive to facilitating maintenace and repair operations and permits the elimination of a bottom plate in housing 5 formerly used for mounting the functional components which in the machine according to the invention are mounted in the top portion thereof.

This arrangement offers the additional advantage of permitting the provision of a lower adjustable ballast weight with particular advantage in the case of a combination-type laundry dryer.

The main characteristic of mounting the condensing apparatus at a level above that of the condensate collecting receptacle at positons readily accessible for the user is of course also advantagous in the case of a laundry drying machine in which the remaining functional components are disposed at other locations. Any such arrangement permits a pump and conduit for lifting the condensate to a collection receptacle in the upper part of the machine to be omitted.

In addition, both the condenser and the condensate collection receptacle are mounted at positions conducive to facilitating the operation of the drying machine by its user.

In a construction in which there is no condensate collecting receptacle provided inside the dryer, the elevated position of the condenser is particularly advantageous with a view to discharging the condensate at an external discharge location such as a sink or wall drain.

Claims

A condensation-type laundry drying machine, in particular of the front-loading type for domestic use, comprising a closed circuit for the forced circulation of heated drying air through heater elements, the drum containing the laundry and a removably mounted condensation device connected to a condensate collecting receptacle likewise removably mounted in the closure window of the machine, and an opening cooling air circuit for said condenser, characterized in that said condenser (21) is disposed in an upper portion of the machine at a level above that of said condensate collecting receptacle (26), and is connected to said receptacle (26) through a conduit (28) and per se known valve means.

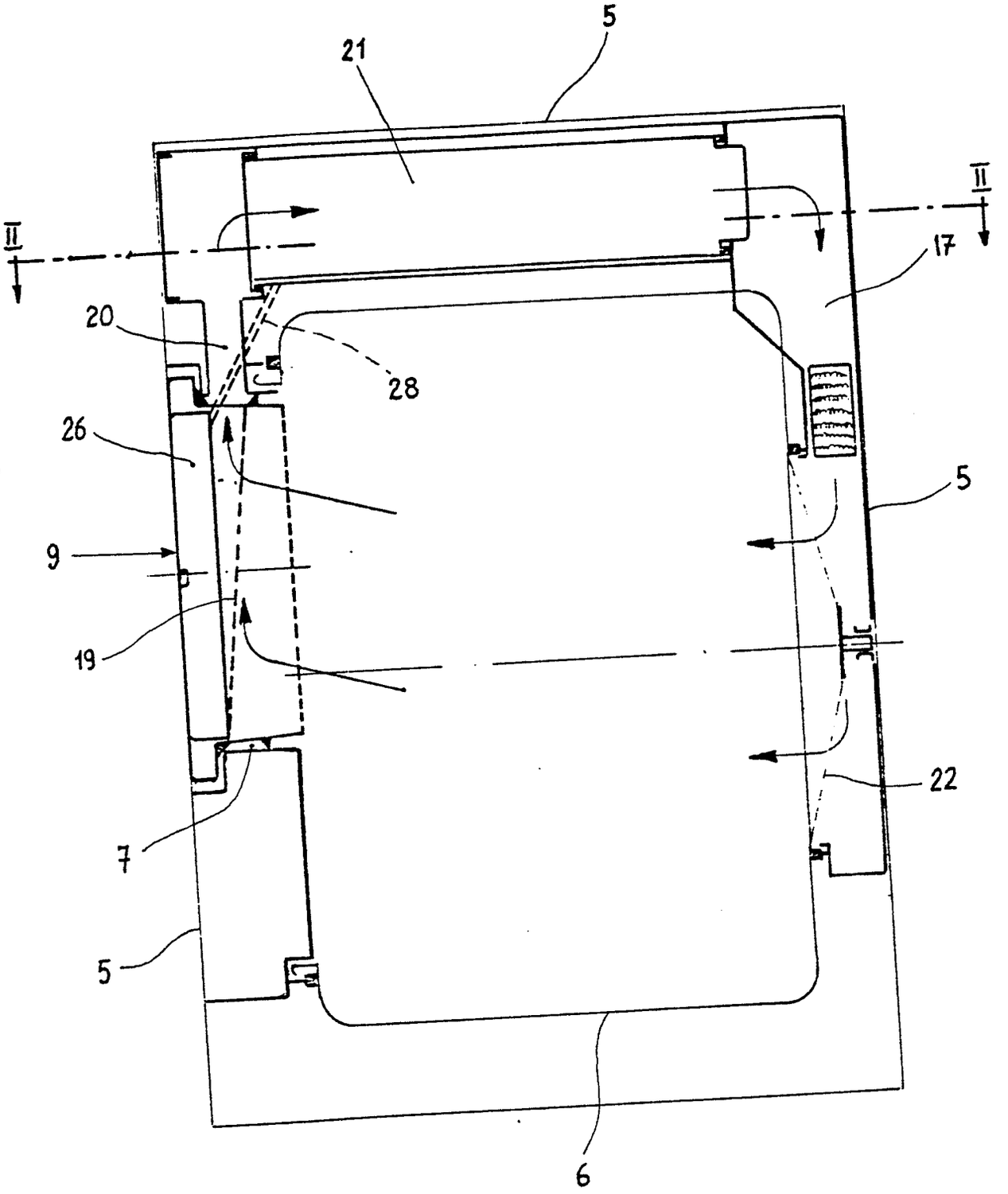

FIG. 1

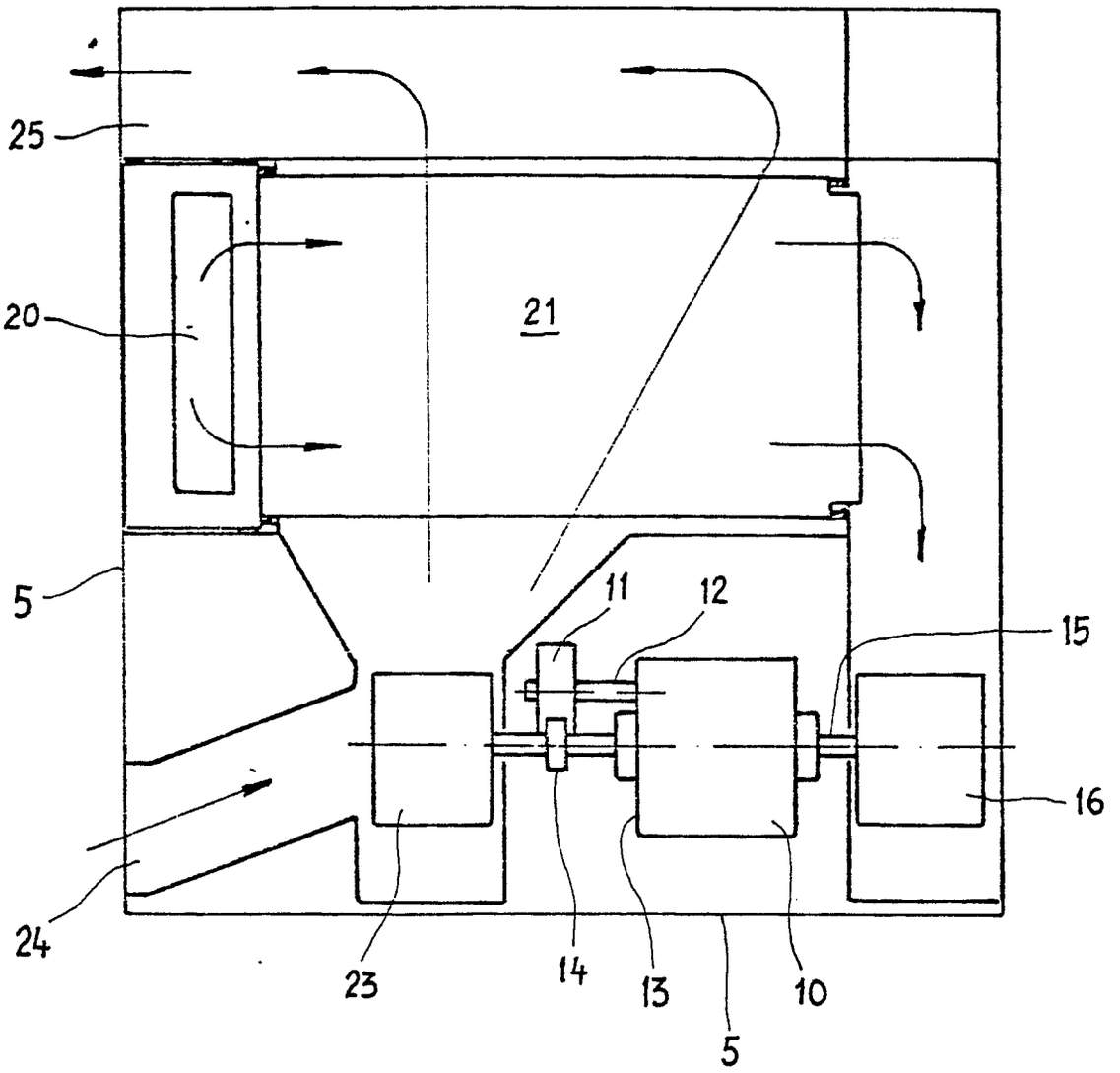

FIG. 2

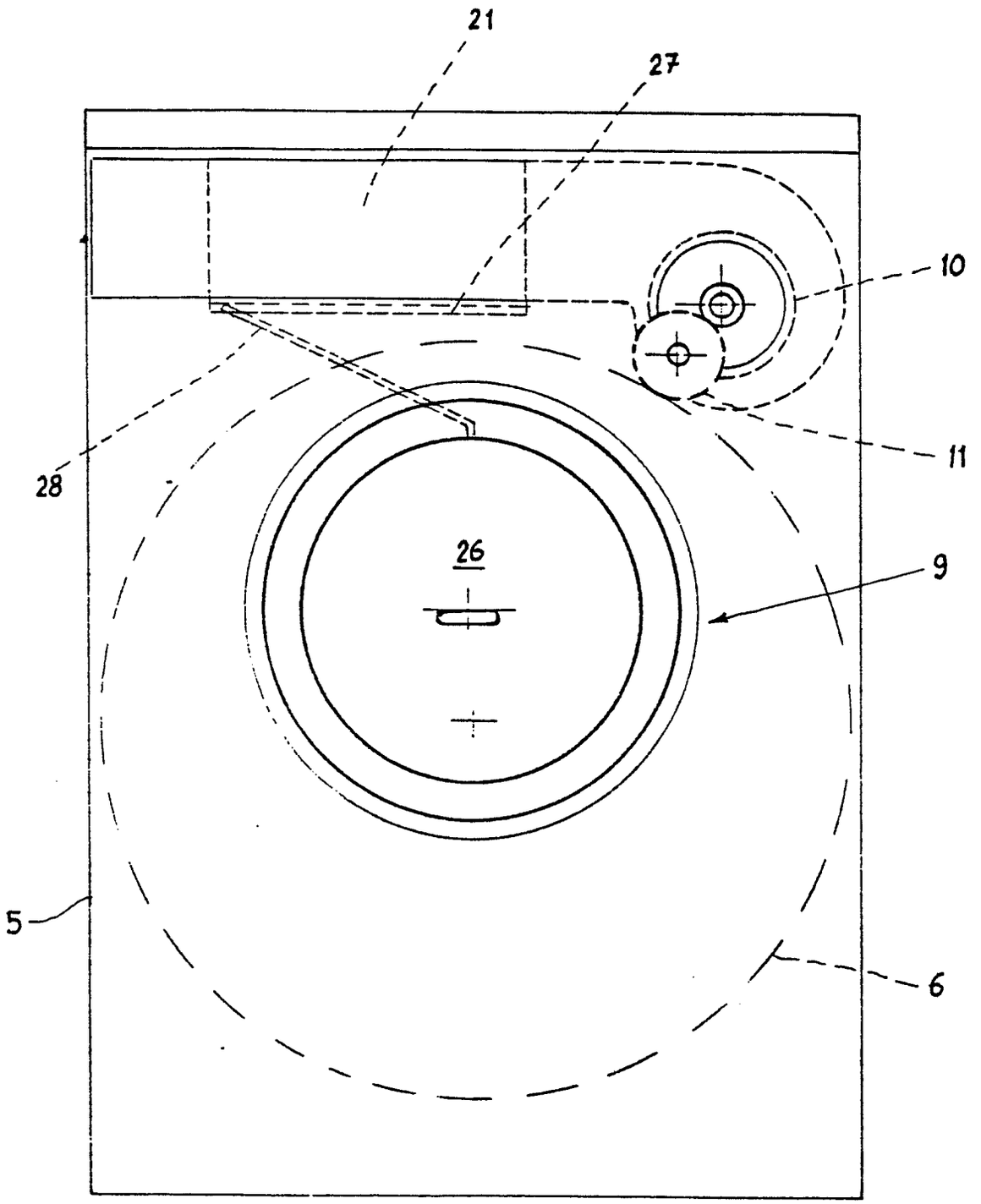

FIG. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 87 10 8485

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.4)
A	FR-A-1 150 407 (MAYERAS) * Page 2, right-hand column, paragraphs 2,4; page 3, left-hand column, paragraph 1; abstract, points 1,2; figures *	1	D 06 F 58/24
A	FR-A-2 087 691 (MARTIN) * Page 2, line 3 - page 3, line 27; claims; figures *	1	
A	GB-A-2 109 520 (TOKYO SHIBAURA DENKI) * Page 2, line 89 - page 3, line 62; figures 2-4 *	1	
A	US-A-3 220 229 (LIVESAY) * Column 2, line 21 - column 3, line 49; figures 2-4 *	1	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	GB-A-2 097 519 (LICENTIA)		D 06 F A 47 L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	27-10-1987	BOURSEAU A.M.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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