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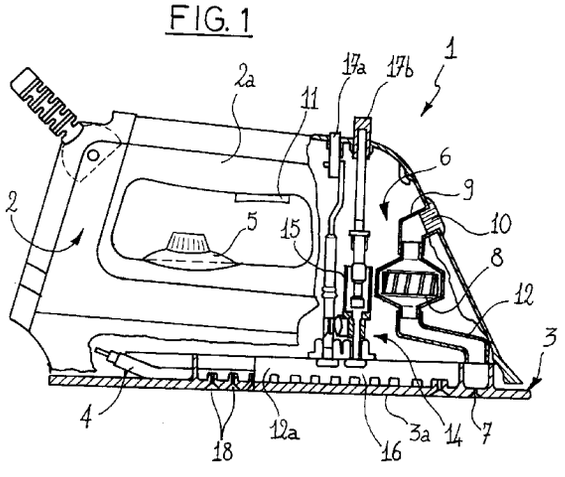
(54) Iron for carrying out ironing both on damp and on dried clothes.

(57) An air-jet iron comprises a casing (2), to the lower part of which a heated ironing plate (3) designed to slide on an article to be ironed is engaged. A compressor (8) housed within the casing (2) or, alternatively, in a feeding unit (20) physically separated from the casing, draws air from the surrounding environment and sends it at a predetermined pressure to first outflow nozzles (7) distributed in the ironing plate (3). In the iron (1) or feeding unit (20) steam is produced which is subsequently sent to second outflow nozzles (18) formed in the ironing plate (3) as well.

FIG. 1



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The present invention relates to an iron for carrying out ironing both on damp and on completely dried cloths, of the type comprising: an ironing plate provided with a substantially flat lower surface designed to act on a cloth to be ironed; a heating element carried by the ironing plate at the upper part thereof and designed to provide the necessary heat for heating the ironing plate; a casing engaged to the upper part of the ironing plate so as to house the heating element and define a handgrip means for the user.

It is known that in order to carry out an efficient ironing action on a cloth, irons of the steam type are presently used. These steam irons conventionally comprise a ironing metal plate designed to slide on the article to be ironed, and a casing associated with the upper part of the plate and defining the iron handgrip.

Usually, the plate is heated by a heating element operatively connected to a thermostat to be operated by the user for regulating the plate temperature depending on the nature of the cloths to be ironed. The ironing plate is also provided with a plurality of steam delivery nozzles, steam being fundamentally generated following two different modalities depending on the type of iron involved.

More particularly, in a first steam iron of known type a tank is provided which is housed within the casing and over the ironing plate. Generally installed on the tank bottom is a delivery valve regulating the outflow of the water contained in the tank to a well formed on the plate. The water present in the well and heated by the heating element is then converted to steam which is ejected through the delivery nozzles formed on the plate.

In a second steam iron of known type provision is made for the use of a boiler physically separated from the iron proper and capable of generating large amounts of high pressure steam. In this case, a flexible hose brings the boiler into fluid communication with a distribution chamber disposed over the ironing plate and communicating with the surrounding atmosphere through said delivery nozzles. Also associated with the boiler is a solenoid shutoff valve operable by the user to selectively enable and inhibit the steam supply.

The foregoing being stated it is noted that, for the purpose of carrying out ironing, an iron performs two operations: on the one hand, it ejects steam for heating and damping the cloths to be ironed and, on the other hand, by virtue of the particular conformation of the plate, presses said cloths thereby smoothing all pleats and unevennesses encountered while sliding on them.

As known, in fact, cloths lend themselves to be easily ironed and therefore to readily lose any pleats and creases present thereon only if they are dampened and heated to the optimal temperature.

It is to be pointed out however that, in spite of the fact that it is necessary to dampen cloths in view of achieving an optimal ironing, with the use of present steam irons it is always indispensable to carry out a complete drying of the articles before ironing them. In fact should the iron be forced to slide on still wet cloths, it would encounter considerable difficulties.

Since it is necessary to dry the washed articles before ironing them, this is time-consuming and very often, above all when very bulky articles are involved, also gives rise to important room problems.

A confirmation of how the above drawbacks are particularly felt is given by the increasingly growing production of washing machines of the type also provided with a drying apparatus, that is machines capable of carrying out a final drying of the articles once the usual washing step has been completed. On the other hand, these washing-drying machines are much more expensive than usual washing machines and in addition an important drying time is required which involves high electrical inputs and therefore high working costs.

In conclusion, at the present state of the art, the necessity to completely dry the articles before ironing them always involves important practical problems.

It should be also noted that, since in known steam irons the ejected steam passes through the article to be ironed and partly deposits thereon, said article, when the ironing operation is over, generally appears damp. As a result, articles that have just been ironed cannot be put away or worn immediately, but it is necessary to let them dry for a while; in fact, should they be immediately worn, they would give an unpleasant feeling of wet and in addition would easily be subjected to get creased again thereby making the ironing work fruitless in a short time.

The main object of the present invention is to solve the problems of the known art by providing an iron capable of carrying out ironing even on wet articles, that is capable of executing a simultaneous and complete drying of the treated cloth during the ironing operation itself.

The foregoing and further objects that will become more apparent in the course of the present description are substantially achieved by an iron for carrying out ironing both on damp and on completely dried cloths which is characterized in that it further comprises compressed-air feeding means for conveying air at a predetermined pressure to one series of outflow nozzles distributed in the ironing plate and opening onto the cloth to be ironed.

Further features and advantages will be best understood from the detailed description of some preferred embodiments of an iron for carrying out ironing both on damp and on completely dried cloths in accordance with the present invention. This description will be given hereinafter by way of non-limiting example with reference to the accompanying drawings, in which:

- Fig. 1 is a diagrammatic partly interrupted cross-sectional view taken along line A-A in Fig. 3, of one embodiment of an air-jet iron according to the present invention;
- Fig. 2 is a partly interrupted cross-sectional view of a second embodiment of an iron according to the invention; and
- Fig. 3 is a bottom view of an ironing plate associated with the irons shown in Figs. 1 and 2.

Referring to the drawings, an iron for carrying out ironing both on damp and on dried cloths in accordance with the present invention has been generally identified by reference numeral 1.

Iron 1 essentially comprises a casing 2 defining a handgrip means 2a at its upper part and associated with an ironing plate 3 at its lower part. The plate 3 is made of a metal material and has a substantially flat lower surface 3a adapted to slide on a cloth to be ironed. Associated with the ironing plate 3 is a heating element 4 located on the ironing plate itself and arranged to supply the necessary heat for heating said ironing plate. The heating element 4 is interlocked to a conventional temperature regulating thermostat 5 adapted to stop the electric supply to the heating element when the ironing plate 3 has reached a work temperature previously programmed by the user.

In an original manner the iron 1 comprises compressed air feeding means 6 designed to draw air from the surrounding atmosphere and convey it, at a predetermined pressure, towards a series of first outflow nozzles 7 suitably distributed in the ironing plate 3 and opening onto the cloth to be ironed.

According to one embodiment shown in Fig. 1, the compressed air feeding means 6 comprises at least one compressor 8 housed within the casing 2 and brought into fluid communication with the external environment through an admission duct 9 connected to an air intake 10 formed in the casing 2, for example at a front portion thereof.

The compressor 8 can be activated by the user by a drive switch not shown as known per se, operable for example through a trigger 11 or similar drive device located at the handgrip means 2a.

In the embodiment diagrammatically shown in Fig. 1, the compressor 8 is of the type provided with an impeller and more exactly a single-stage axial compressor.

Alternatively, still in the case of compressors provided with an impeller, a centrifugal type can be also used, as it is capable of reaching a higher compression ratio than the axial compressor, the number of stages being equal.

Positive displacement compressors of both the reciprocating and rotary type may also be used. In particular positive displacement reciprocating compressors of the type in which a diaphragm or a piston is provided may also be used, as well as positive displacement rotary compressors having either fixed chambers such as sliding-vane compressors in which the vane is associated with the stator, or rotating chambers such as positive displacement compressors provided with blade rotors, lobe rotors or throcoid-shaped rotors.

Also associated with the compressor 8 is a delivery duct 12 sending compressed air to a dispensing duct 12a disposed on the ironing plate 3 within the casing 2. In greater detail, this dispensing duct 12a extends adjacent to a perimetric edge 3b of the ironing plate 3 and communicates with the external environment through said first series of outflow nozzles 7 that, in this manner, deliver air from the compressor 8 onto the cloth of the article to be ironed.

In accordance with the invention, as shown in Fig. 3, the first outflow nozzles 7 are distributed parallelly of the perimetric edge 3b of the ironing plate 3 according to a first ideal curve 13 defined by two symmetrically-disposed arcs converging towards a front area 3c of the ironing plate.

The iron 1 is further comprised of steam supplying means 14 that, in the embodiment shown in Fig. 1, is positioned within the rising 2 as well. In more detail, this steam supplying means 14 comprises a tank not shown as known per se and conventional , disposed over the ironing plate 3 and designed to be filled with a given amount of water. Engaged to the lower part of said tank is a delivery valve 15 capable of adjusting the water flow coming out of the tank itself which is then conveyed to a distribution chamber 16 formed directly on the ironing plate 3. In known manner, the delivery valve 15, of the pin type for example, is operatively connected to an adjusting knob 17a and a push-button 17b, both located close to the handgrip means 2a and designed to establish the steam flow to be delivered under normal operation conditions and control the emission of an instantaneous steam jet. The distribution chamber 16 communicates with the external environment through a series of second outflow nozzles 18 homogeneously distributed in the ironing plate 3 and enabling venting of steam, as it is produced within the distribution chamber, onto the article to be ironed.

In greater detail, the second outflow nozzles 18 are located in the ironing plate 3 along a second ideal curve 19 that is also defined by two symmetrically disposed arcs converging towards a front area 3b of the ironing plate itself. More particularly, the second ideal curve 19 extends inwardly of and parallel to the first ideal curve, so that it is substantially enveloped thereby.

In a second embodiment shown in Fig. 2, the compressor 8 is housed within a feeding unit 20 physically separated from the iron 1. In this case the compressor 8 draws air from the surrounding atmosphere through an admission duct 9 connected to an air intake 10 arranged in the feeding unit 20.

In order to bring the compressor 8 into fluid com-

munication with the dispensing duct 12a defined within the casing 2 and therefore enable the compressed air to flow out through the first nozzles 7, provision is made for at least one flexible delivery hose 21 of a length sufficient to allow the iron 1 to be moved easily.

Still with reference to the second embodiment shown in Fig. 2, the steam feeding means 14 comprises a steam boiler 22 housed within said feeding unit 20 and brought into fluid communication with the distribution chamber 16 formed on the upper part of the ironing plate 3 by a second flexible delivery hose 23. In known manner, a shutoff solenoid valve 24 is operatively interposed between the boiler 22 and second flexible delivery hose 23, which solenoid valve is operable by the push-button 17b located at the handgrip means 2a in order to selectively open and close the steam flow coming out of the boiler itself.

Operation of the air-jet iron described above mainly as regards structure, is as follows.

In both of the described embodiments, the compressed air delivery from the first outflow nozzles 7 is achieved by acting on the trigger 11 arranged at the handgrip means 2a and adapted to control starting of the compressor 8. Consequently air is drawn through the admission duct 9 and sent to either the delivery duct 12 or first flexible delivery hose 21, depending on the embodiment put into practice.

The air, compressed to a predetermined pressure, then reaches the dispensing duct 12a extending on the upper surface of the ironing plate 3, at the first outflow nozzles 7. In the dispensing duct 12a the compressed air is heated to a predetermined temperature by the ironing plate 3 and is then ejected through the firt outflow nozzles 7.

Advantageously, by virtue of the compressed air feeding means, the iron of the invention lends itself to be used for carrying out ironing of articles still wet directly coming from a wrinking step or a centrifugation step of the washing machine.

In fact, part of the hot air jet coming out of the first outflow nozzles 7 passes through the wet fabric and vaporizes the water particles contained therein bringing about an efficient ironing action and simultaneously drying the fabric itself.

At the same time, the remaining part of the air jet as proportionately delivered forms an air cushion between the ironing plate and the article to be ironed, capable of greatly reducing the resistance to the movement of the plate on the fabric.

Advantageously, if dried articles are to be ironed, operation of the steam feeding means may be carried out simultaneously with that of the compressed air means. In this case a steam ironing similar to that executed by usual steam irons is achieved, while at the same time a drying action is also exerted, due to the air jet issued from the first outflow nozzles. In the connection, since the first outflow nozzles 7 are distributed in the first ironing plate 3 following the first ideal curve 13 substantially enveloping the second ideal curve 19 according to which the second outflow nozzles are distributed, a particularly advantageous result is achieved. In fact, by virtue of the above expedient, the air jet from the first outflow nozzles constantly encompasses the steam jet from the second outflow nozzles thereby constantly carrying out a thoroughly drying action while the ironing plate is sliding on the article to be treated.

The invention achieves important advantages.

It will be recognized in fact that, tbanks to the presence of the compressed air feeding means, even wet articles can be ironed, such as for example those just coming from a washing cycle, which involves an important advantage in terms of pratical operability and gain in time.

It should be also noted that the present invention offers important advantages even when ironing is to be executed on dry articles, because these articles, while being steam ironed, are also simultaneously dried by the compressed air jet.

Obviously many modifications and variations may be made to the present invention without departing from the scope of the appended claims.

For example, it may be envisaged that the compressed air feeding means and steam supplying means should be connected, optionally via a commun flexible delivery hose, to a single series of outflow nozzles suitably arranged in the ironing plate and through which air and steam will be delivered either separately in succession or simultaneously.

Claims

1. An iron for carrying out ironing on both damp and dried cloths, comprising:
   - an ironing plate (3) provided with a substantially flat lower surface (3a) designed to act on a cloth to be ironed;
   - a heating element (4) carried by the ironing plate (3) at the upper part thereof and designed to provide the necessary heat for heating the ironing plate; and
   - a casing (2) engaged to the upper part of the ironing plate (3) so as to house the heating element and define a handgrip means (2a) for the user,

   characterized in that it further comprises compressed-air feeding means (6) for conveying air at a predetermined pressure to one series of outflow nozzles (7) distributed in the ironing plate (3) and opening onto the cloth to be ironed.

2. An iron according to claim 1, characterized in that said compressed air feeding means (6) compris-

es:

- at least one air compressor (8) housed within the casing (2);
- at least one admission duct (8) bringing the compressor (8) into fluid communication with an air intake (10) formed in the casing (2);
- at least one dispensing duct (12a) defined within the casing (2) on the ironing plate (3) and communicating with the surrounding atmosphere through said series of first outflow nozzles (7); and
- at least one delivery duct (12) bringing the compressor into fluid communication with the dispensing duct (12a).

3. An iron according to claim 1, characterized in that said compressed air feeding means (6) comprises:

- a feeding unit (20) physically separated from said casing (2);
- at least one air compressor (8) housed within the feeding unit (20);
- at least one admission duct (9) bringing the compressor (8) into fluid communication with an air intake (10) arranged in the feeding unit (20);
- at least one dispensing duct (12a) defined within the casing (2) on the ironing plate (3) and communicating with the external environment through said series of first outflow nozzles (7); and
- at least one flexible delivery hose (21) bringing the compressor (8) into fluid communication with said dispensing duct (12a).

4. An iron according to claim 1, characterized in that provision is also made for steam feeding means (14) comprising:

- a tank housed within the casing (2) over the ironing plate (3) and designed to hold a given amount of water;
- a delivery valve (15) engaged to the lower part of the tank for adjusting the water flow coming out of the tank itself;
- a distribution chamber (16) formed over the ironing plate (3) at a position below the delivery valve (15) and designed to receive water from the delivery valve itself; and
- a series of second outflow nozzles (18) distributed in the ironing plate (3) for bringing the distribution chamber (16) into fluid communication with the surrounding atmosphere.

5. An iron according to claim 3, characterized in that it further comprises steam feeding means (14) comprising:

- a steam boiler (22) housed within the feeding unit (20);
- a steam distributing chamber (16) formed over the ironing plate (3);
- at least one second flexible delivery hose (23) bringing the steam boiler (22) into fluid communication with said steam distributing chamber (16);
- a series of second outflow nozzles (18), distributed in the ironing plate (3), which bring the steam distributing chamber (16) into fluid communication with the surrounding atmosphere; and
- a shutoff solenoid valve (24) operatively interposed between said boiler (22) and second flexible delivery hose (23) for selectively opening and closing the steam flow coming out of the boiler itself.

6. An iron according to claim 1, characterized in that the firdt outflow nozzles (7) are distributed in the ironing plate (3) following a first ideal curve (13) defined by two symmetrically disposed arcs converging towards a front area of the ironing plate.

7. An iron according to claim 6, characterized in that provision is also made for steam feeding means (14) comprising second outflow nozzles (18) distributed in the ironing plate (3) following a second ideal curve (19) defined by two symmetrically disposed arcs converging towards a front area of the ironing plate.

8. An iron according to claim 7, characterized in that said first ideal curve (13) is located close to a perimetric edge of the ironing plate (3) and envelops said second ideal curve (19).

9. An iron according to claim 1, characterized in that said compressed air feeding means (6) comprises a compressor (8) provided with impeller, of the axial type.

10. An iron according to claim 1, characterized in that said compressed air feeding means (6) comprises a compressor (8) provided with an impeller, of the centrifugal type.

11. An iron according to claim 1, characterized in that said compressed air feeding means (6) comprises a positive displacement piston compressor.

12. An iron according to claim 1, characterized in that said compressed air feeding means (6) comprises a positive displacement diaphragm compressor.

13. An iron according to claim 1, characterized in that

said compressed air feeding means (6) comprises a positive displacement rotary compressor having fixed chambers.

14. An iron according to claim 1, characterized in that said compressed air feeding means (6) comprises a positive displacement rotary compressor having rotating chambers.

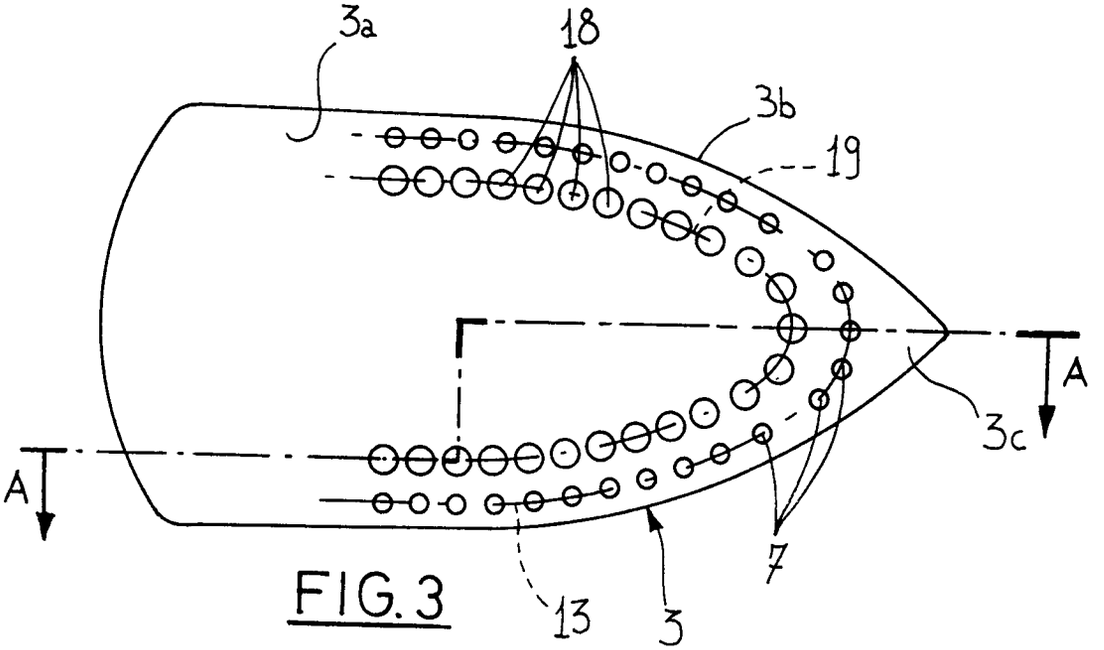
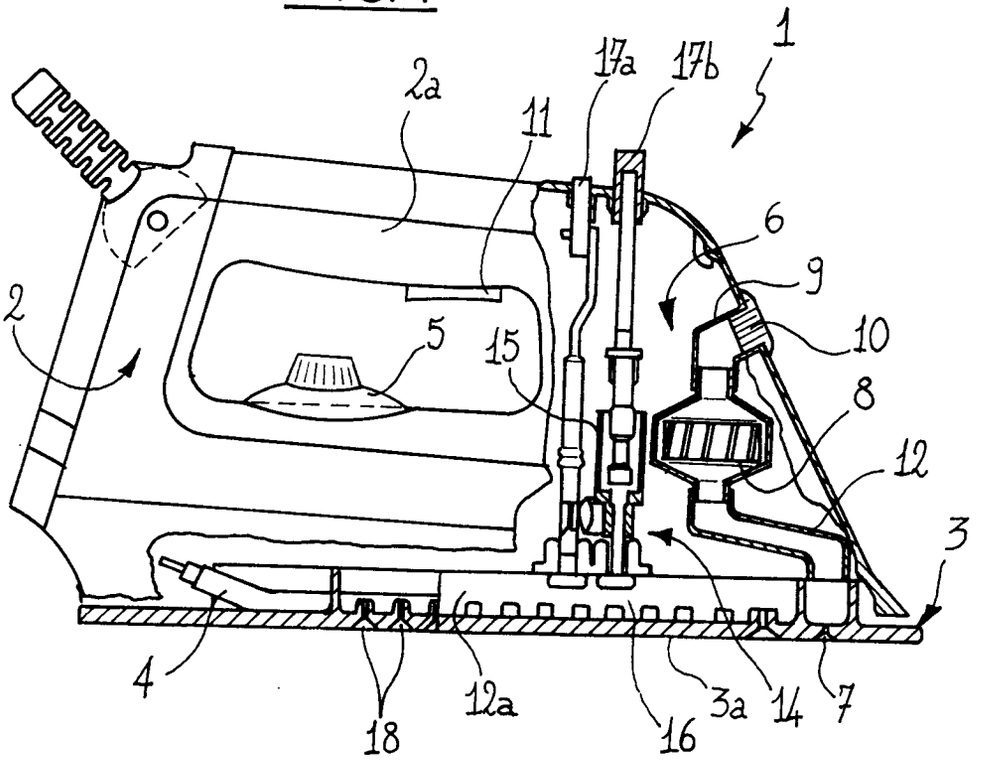

3a
18
3b
19
A
A
3c
7
13
3

FIG. 3

FIG. 1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17a
17b
2a
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12a
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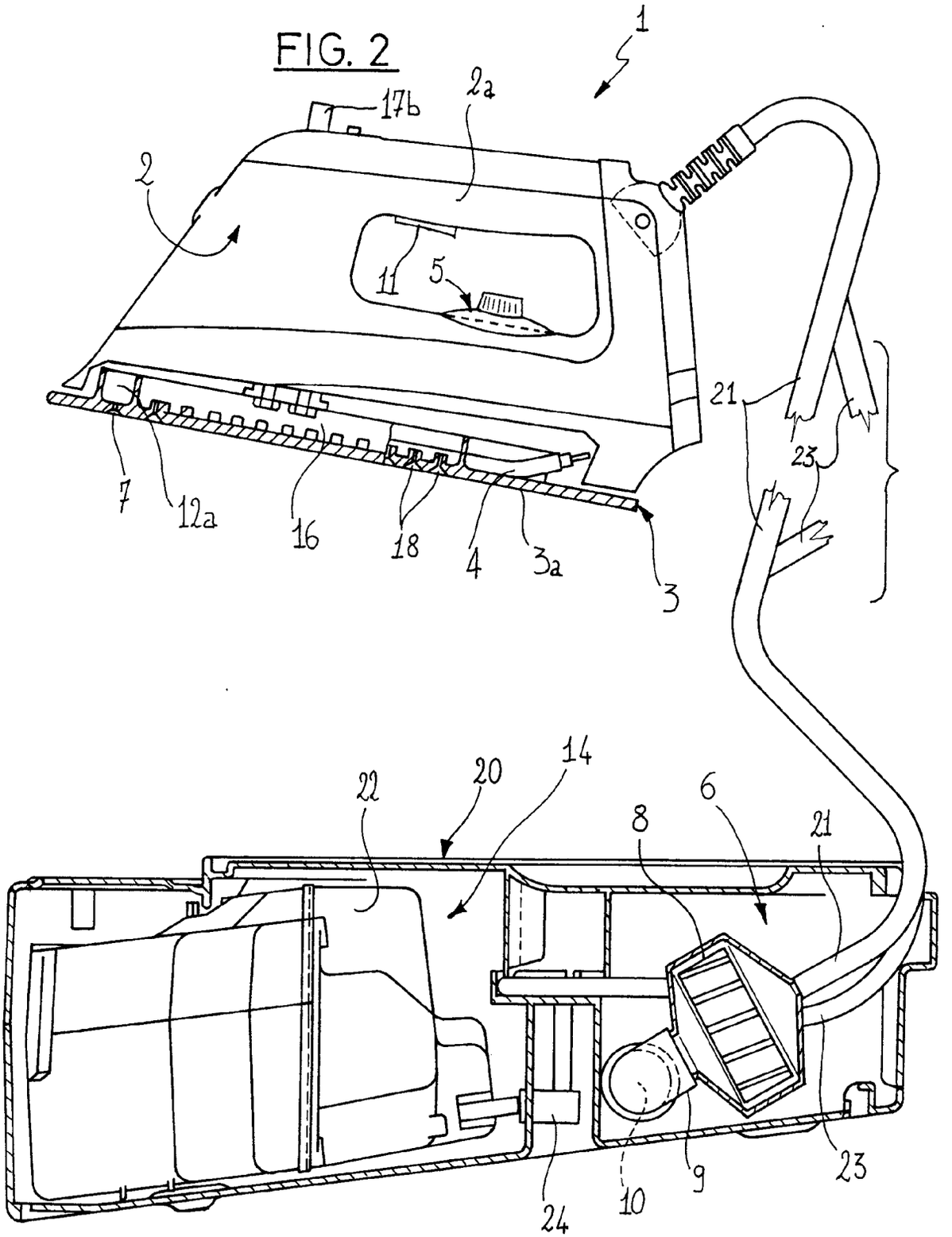
3a
14
7

FIG. 2



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EUROPEAN SEARCH REPORT

Application Number
EP 94 83 0094

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	FR-A-2 143 665 (F. AZZOLINI) * page 2, line 28 - page 4; figures *	1-9	D06F75/10
X A	DE-C-476 394 (J. SCHNEIDER) * claims; figures *	1,3,6,10 2,4	
X	FR-A-1 147 862 (HOOVER LIMITED) * claims; figures *	1,3	
X	US-A-1 593 898 (CANNON ENGENEERING CO.) * page 8, line 14 - line 84; figures *	1,3,4	

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	17 June 1994	Courrier, G

CATEGORY OF CITED DOCUMENTS

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