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Method of sealing off the vaporisation
chamber of a steam iron

The invention relates to a method of sealing off a vaporisation chamber provided in a sole member of a steam iron by means of a cover, and to a sole member for use in such a method and to apparatus
5 for carrying out the method.

In electric steam irons operating by the drip principle, the steam producing chamber in which water is converted from the liquid to the vapour phase and the associated steam channel system
10 are mounted in the electrically heated sole member of the iron. The water drips out of the water tank into the steam producing chamber. The wet steam formed therein is subjected to superheating in steam channels. The steam emerges on the soleplate
15 of the iron out of steam escape holes leading from the steam channels. By additionally injecting water into the steam producing chamber, into separately provided chambers or directly into the steam channels, extra steam can be generated in various types of
20 iron. The entire area of the sole member of the iron in which steam is generated and superheating occurs is commonly referred to as the vaporisation chamber.

The sole member of the iron is generally
25 die-cast from aluminium. After the sole member of the iron has been formed it is subjected to further working processes before the sole member can be assembled with the other individual components to form a steam iron. One of the individual processes
30 is the closing off of the vaporisation chamber by means of a cover.

It is known to close off the vaporisation chamber of a steam iron with a cover. For this purpose, the surface of the outer wall of the vaporisation chamber of the sole member blank, which will later be joined to the cover of the vaporisation chamber, is subjected to a special surface machining. Then, before the cover of the chamber is put on, a special sealing composition is applied to the sealing surfaces of the walls of the vaporisation chamber and the cover is connected to the sole member by means of screws or rivets. These very laborious working steps are of particular importance since, for reasons of safety in operation, no steam must escape from the vaporisation chamber during use of the steam iron and thus enable moisture to penetrate into the interior of the iron.

According to the invention there is provided a method of sealing off a vaporisation chamber provided in a sole member of a steam iron by means of a cover, the vaporisation chamber having an outer wall which has remote from the sole of the iron an upper edge in which a groove-like recess is formed, wherein the flow limit of the material of the cover is lower than the flow limit of the material of the sole member, and wherein the cover is placed over the vaporisation chamber in contact with the outer wall upper edge and high pressure is applied to the cover, the pressure being such that in the region of the groove-like recess the cover material flow limit is exceeded but the sole member material flow limit is not exceeded, whereby the cover is sealingly connected to the sole member before the pressure is released.

In such an arrangement, as a result of the flow limit of the cover material being exceeded when the cover and the sole member are pressed together, some of the cover material is displaced, adapted to the contours of the chamber wall and held in this

position. Thus by selecting the materials of the cover and the sole member to have the flow properties discussed above, then the cover material can flow into the groove-like recess during the compression and after the cover and sole member have been joined together a pressure-tight joint is obtained between the cover and the wall of the vaporisation chamber.

The chamber cover and the sole member may be joined together by means of screws or rivets. Then the pressure applied to the cover e.g. by a press can be released and the workpiece can be removed from the press. When the vaporisation chamber of a steam iron is closed off using such a method there is no need for any additional sealing means such as silicon rubber, for example. It is therefore possible to connect the cover of the vaporisation chamber to the wall thereof without any machining of the contact surface and any additional sealing means, whilst ensuring that adequate sealing is obtained to prevent steam and hence moisture from penetrating into the interior of the iron during subsequent use.

Enlargement of the contact surface between the cover and the sole member and the absence of any additional sealing materials can ensure a considerably improved heat transfer between the sole member and the cover. This in turn results in a significant increase in the efficiency of the vaporisation chamber when converting water flowing out of the water tank of the vaporisation chamber from the liquid into the vapour phase.

The invention also provides a sole member for use in the methods disclosed herein, wherein the groove-like recess formed in the upper edge of the vaporisation chamber wall has a trapezoidal cross section, widening towards the sole of the iron. During the method, some of the cover material which has been stressed beyond its flow limit penetrates into the groove-like recess and remains therein.

With the groove-like recess in the trapezoidal form, surprisingly, there is no need for any connection between the cover and the sole member of the iron by additionally screwing or riveting these two parts
5 together. Preferably the outer wall enclosing the vaporisation chamber extends perpendicularly to the sole of the iron.

It has proved particularly advantageous to carry out the method according to the invention by
10 using apparatus comprising a press having a pressure stamp for applying high pressure to the cover, the pressure stamp having a pressing surface projecting downwardly from the base of the stamp and shaped to correspond to the upper edge of the outer wall
15 of the vaporisation chamber, and the width of the pressing surface being equal to or greater than the width of opening of the groove-like recess formed in said upper edge of the outer wall. In this way it is possible to ensure that the pressing surface
20 of the stamp does not exert any shearing action on the cover, but that the cover material, stressed beyond its flow limit, flows into the groove-like recess and fills the recess, so that it is permanently deformed when the pressure is released.

25 Preferably the base of the stamp has contour surfaces projecting downwardly therefrom, the contour surfaces being shaped to correspond to further walls of the sole member, which walls extend perpendicularly to the sole of the iron and define steam channels
30 in the vaporising chamber, the width of the contour surfaces being equal to or greater than the spacing of said further walls of the sole member.

In this way, the steam producing chamber and the steam channels connected thereto in the cover area
35 are kept separate from one another in pressure-tight

manner, so that the steam produced in the steam producing chamber is forced to flow through the entire length of the steam channels. This is particularly important if the steam and extra steam are produced in two
5 separate areas and supplied to the sole of the iron through two separate channel systems. In this way, steam short circuits between the two steam systems or from the steam producing chamber to the steam channels are prevented in absolutely reliable manner.

10 An embodiment of the invention will now be described by way of example and with reference to the accompanying drawings, in which:-

Figure 1 shows a partial cross-section through
15 the sole of a steam iron with a cover placed on the vaporisation chamber before the vaporisation chamber is closed off.

Figure 2 shows a partial area of the sole of
20 a steam iron with the vaporisation chamber closed off by means of a cover after the sealing process and a partial cutaway section in the region "x".

Figure 3 shows a plan view of the side facing
25 the handle of the sole of a steam iron, only half of which is shown, with a vaporisation chamber mounted therein.

A vaporisation chamber comprises a steam producing chamber 1 and steam channels 13, 14 arranged in a
30 sole member 5 of the iron, which is not fully shown. The steam channels are defined by upright walls 7 and the steam channel 14 is used to superheat the steam. Below the steam channel 14, an electrical tubular heating element 15 is cast into the sole
35 member 5 of the iron. During steam ironing, the steam escapes out of the steam channel 13 via a steam escape hole 16 to the sole 3 of the iron. A recess

8 is provided in the upper edge 4 of the outer wall 6 of the sole member 5. In order to achieve a tight seal of the vaporisation chamber with a cover 2, it is particularly advantageous if the recess 8 is provided throughout the entire edge 4 of the outer wall 6. It is also possible to provide recesses in the upper edges 17, 17' of the walls 7 of the steam channel 14, thereby achieving an additional sealing action. The recess 8 may take various spatial forms. The recess 8 shown by way of example has a trapezoidal cross-section, which results in a particular sealing and connecting action between the cover 2 and the sole member 5 of the iron, as discussed hereinbefore.

15 A pressure stamp 9 of a press is arranged over the cover 2. A pressing surface 11 and a contour surface 12 project downwardly from the base 10 of the stamp 9.

When the preferred method is carried out, first of all the cover 2 is placed on the sole member 5 of the iron and then the stamp 9 of the press is lowered. During the pressing operation, the pressure of the press first of all acts only in the region of the pressing surface 11 and the contour surface 12 on the cover. It is particularly important that the width of the pressing surface 11 and contour surface 12 are equal to or greater than the widths of opening of the groove-like recess 8 or of the steam channels 13, 14. As a result of the high contact pressure exerted on the cover 2 by the pressing surface 11 and the contour surface 12 of the stamp 9, the material of the cover 2 exceeds its flow limit and undergoes plastic flow in the region of the pressing surface 11 and contour surface 12. The material is displaced into the recess 8 or into the steam channels 13, 14, thus producing the desired seal between the cover 2 and the sole member 5 of the iron.

It will thus be seen that in the preferred method it is possible to simplify the working steps for tightly connecting the cover of the vaporisation chamber to the blank of the sole member by using
5 a special process and, particularly, to dispense with the surface machining of the blank and the need for separate sealing means.



Claims

1. A method of sealing off a vaporisation chamber provided in a sole member of a steam iron by means of a cover, the vaporisation chamber having an outer wall which has remote from the sole of the iron an upper edge in which a groove-like recess is formed, wherein the flow limit of the material of the cover is lower than the flow limit of the material of the sole member, and wherein the cover is placed over the vaporisation chamber in contact with the outer wall upper edge and high pressure is applied to the cover, the pressure being such that in the region of the groove-like recess the cover material flow limit is exceeded but the sole member material flow limit is not exceeded, whereby the cover is sealingly connected to the sole member before the pressure is released.
2. A sole member of an iron for use in a method as claimed in claim 1, wherein the groove-like recess has a trapezoidal cross section, widening towards the sole of the iron.
3. Apparatus for carrying out a method as claimed in claim 1, comprising a press having a pressure stamp for applying said high pressure to the cover, the pressure stamp having a pressing surface projecting downwardly from the base of the stamp and shaped to correspond to the upper edge of the outer wall of the vaporisation chamber, and the width of the pressing surface being equal to or greater than the width of opening of the groove-like recess formed in said upper edge of the outer wall.
4. Apparatus as claimed in claim 3, wherein the base of the stamp has contour surfaces projecting



downwardly therefrom, the contour surfaces being shaped to correspond to further walls of the sole member, which walls extend perpendicularly to the sole of the iron and define steam channels in the
5 vaporising chamber, the width of the contour surfaces being equal to or greater than the spacing of said further walls of the sole member.

5. A method of sealing off a vaporisation chamber
10 provided in a sole member of an iron by means of a cover, substantially as hereinbefore described with reference to the accompanying drawings.

6. A sole member of an iron substantially as herein-
15 before described with reference to the accompanying drawings.

7. Apparatus for carrying out a method of sealing
off a vaporisation chamber provided in a sole member
20 of an iron by means of a cover, the apparatus being substantially as hereinbefore described with reference to the accompanying drawings.
