

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 86850096.8

(51) Int. Cl.⁴: **H 05 B 3/66**

(22) Date of filing: 19.03.86

(30) Priority: 22.03.85 SE 8501418

(43) Date of publication of application:
24.09.86 Bulletin 86/39

(84) Designated Contracting States:
DE FR GB IT SE

(71) Applicant: **Kanthal AB**
Box 502
S-734 01 Hallstahammar(SE)

(72) Inventor: **Johansson, Lars Göran**
Smultronvägen 10
S-734 00 Hallstahammar(SE)

(74) Representative: **Arwidi, Bengt**
Kanthal AB Box 502
S-734 01 Hallstahammar(SE)

(54) **Method and device for suspension of an electric resistance element.**

(57) This invention relates to a method of suspending electrical resistance elements in industrial furnaces in the first place. Suspension on fibre board, i.e. blocks or boards of fibre material, according to the invention eliminates heat dissipation to the outer walls of the furnace and gives a simple suspension of the elements. The elements (1) are hooked onto profiles (2) which are stuck into the fibre blocks (3). The profiles are suitably manufactured in the same material as the resistance elements and are fixed in the fibre blocks without any previous making of holes.

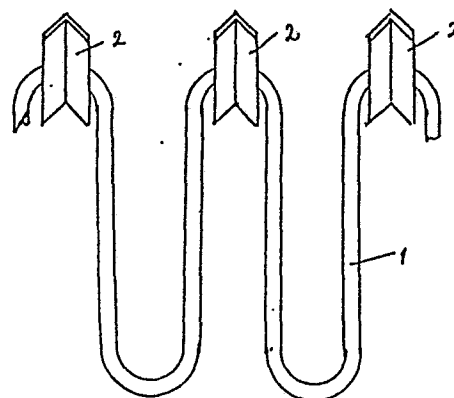


FIG. 1

METHOD AND DEVICE FOR SUSPENSION OF AN ELECTRIC RESISTANCE
ELEMENT

This invention relates to a method and device for suspension of an electric resistance heating element. The invention is in the first place intended to be used in industrial furnaces.

In electrically heated industrial furnaces the resistance elements are usually meander shaped with a varying number of loops. The number of loops is usually in the interval of 5 to 50. The loops are attached vertically on the inner walls of the furnace. To avoid deformation of the elements during operation every single loop should have a support or attachment on the wall. The change from furnace walls of bricks to walls built up of blocks or mats of fibre material has entailed new problems concerning suspension of the elements on these walls. This invention relates to suspension of meander shaped electrical resistance elements on fibre board walls i.e. rigid blocks or boards of ceramic fibre material.

Suspension of the resistance elements on fibre blocks involve several problems. To give the elements sufficient support as well as reduce the local pressure on the fibre blocks every single meander loop should have a support separately attached to the fibre blocks. The number of supports in a furnace can therefore be very large. One way to solve the problem of the limited capacity of the blocks to endure pressure is letting the suspension devices be fixed in the steel construction or plating which generally forms the outer wall of the furnace. The suspension devices have, however, a much higher thermal conductivity than the insulation material in the walls and letting the suspension devices be fixed in the outer walls leads to heat losses from the furnace by this way. A further disadvantage are the installation problems involved with such solutions. Another way to suspend elements on fibre blocks is to build suspension devices e.g. in the form of ceramic tubes running horizontally, parallel to the furnace walls inside the fibre blocks. On these tubes hooks are then suspended sticking out from the fibre blocks into the furnace chamber and on these hooks the elements are suspended in their turn. The disadvantages with this construction are first

the large number of details needed for the suspension of the elements and second that the positions of the elements are determined by the tubes cast into the fibre blocks. This requires on the one hand high precision at production and set-up of the blocks and on the other hand that e.g. when replacing elements their shape is not affected in such a way that they do not fit onto the suspension devices any more.

This invention aims at giving a simple suspension of the elements with the possibility to place these anywhere on the furnace walls eliminating at the same time the above problems. The invention is distinguished by the characteristics indicated in the patent claims.

With reference to the attached figures the invention will be described more detailed by some design examples.

Figure 1 shows some loops of a meander shaped resistance element of metal wire. The element is suspended on suspension devices according to the invention.

Figure 2 shows a cross-section of a furnace wall where two elements are suspended in accordance with the invention.

Figure 3 shows a preferred type of a suspension device according to the invention.

Figure 4 a-d shows cross-sections of different profiles according to the invention.

Figure 5 shows a design of the suspension device according to figure 3 especially fitted for elements made of strip shaped material.

The resistance element (1) shown in fig. 1 is suspended on a number of suspension devices (2) which best consists of profiles of the same material as the resistance element. The profiles can be given the shape as shown in figures 3 and 4d. Without any previous making of holes in the fibre blocks such a profile can then be stuck into the block and provide the suspension device for a meander loop. The profiles should be stuck into the fibre block by at least 2/3 of their length. The distribution of the profiles is considerably facilitated by the fact that these do not need to be set out until the furnace is finished and the elements shall be placed on the profiles. The ready elements can

3.

there be used as master component for the installation of the profiles. The profiles should be stuck into the wall with a gradient of about 45° against the vertical plane as it is shown in figure 2. In figure 2 two profiles (2) are shown which support an element (1) each. The profiles are stuck into the fiberblocks (3) forming the inner wall of a furnace. The furnace wall is also provided with a further insulation (4) and an outer wall (5) of sheet metal.

Many embodiments of the invention are possible regarding the applications in question. E.g. can profiles be designed with different cross-sections as shown in fig. 4 a-d. To obtain sufficient support for the elements and at the same time distribution of the pressure on the fibre block the profile should be such that the outer edges were bent minimum 60° from each other i.e. the angle which in fig. 4a has been marked by v_1 shall be minimum 60° . In the protruding design shown in fig. 4d the angle v_2 should be about 120° which corresponds to the outer edges having been bent 60° from each other.

Fig. 5 shows the design type of the invention which fits the element of strip shaped material. On a profile (2) a bridge (6) is fixed, e.g. by welding. The profile is stuck into one of the fibre blocks (3) forming the furnace wall whereafter the resistance element (1) is suspended and supported by the bridge.

METHOD AND DEVICE FOR SUSPENSION OF AN ELECTRIC RESISTANCE
ELEMENT

CLAIMS

1. Method to suspend a meander shaped electrical resistance element on walls of fibre board in furnaces or similar places where for each meander loop an oblong material is formed to a profile bent in its longitudinal direction so that its outer edges are bent at least 60° from each other so that the hereby received profile without any previous making of holes is stuck into the fibre board by at least $\frac{2}{3}$ of its length with a gradient of about 45° against the vertical plane whereafter the meander loop is suspended at the protruding part of the profile.
2. Method according to claim 1 in which the element to be suspended is first used as master component for the installation of the profiles.
3. Profile for suspension of meander shaped electric resistance elements which departing from a plane, oblong material was formed to a profile bent in its longitudinal direction so that its outer edges were bent at least 60° from each other.
4. Profile according to claim 3 which has a v-shaped section where the sides form an angle of about 90° with each other.

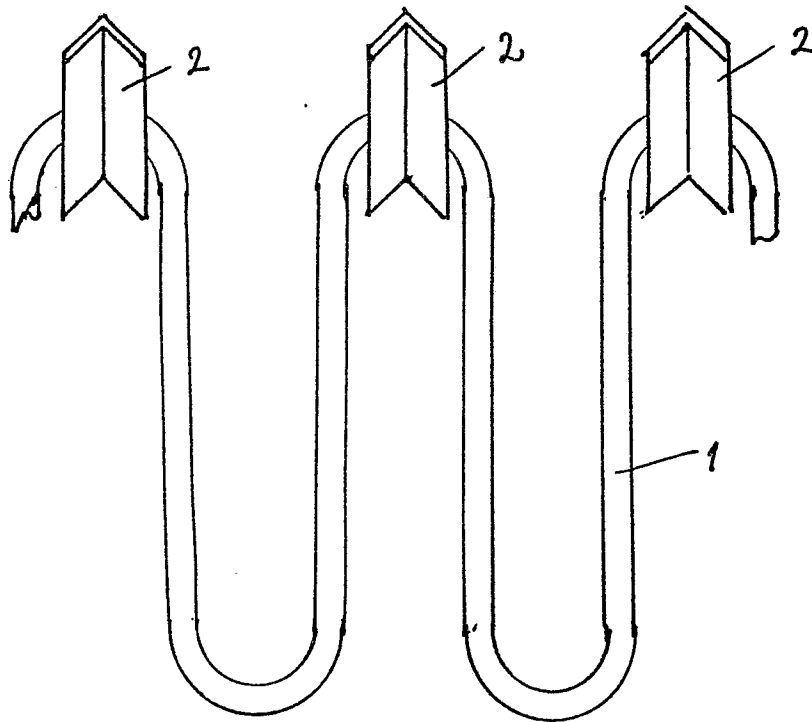


FIG. 1

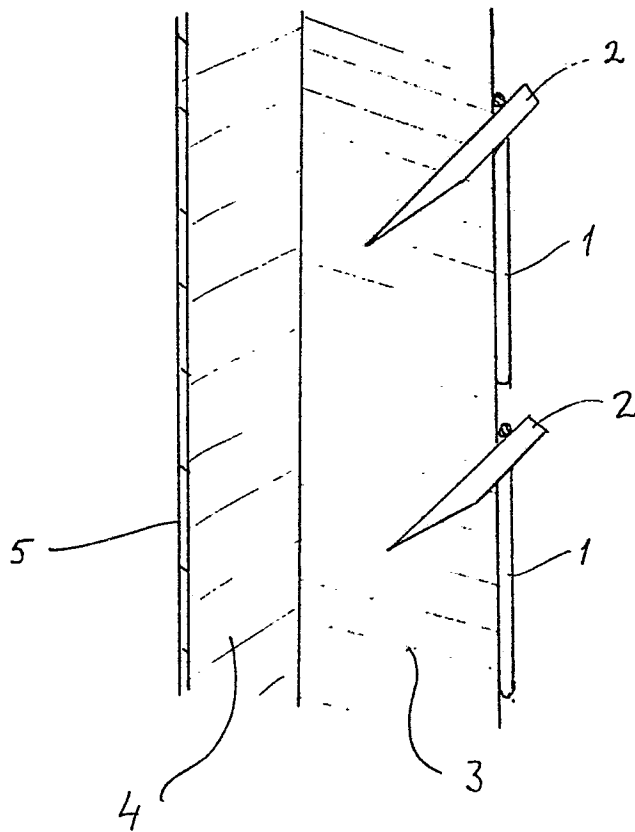


FIG 2

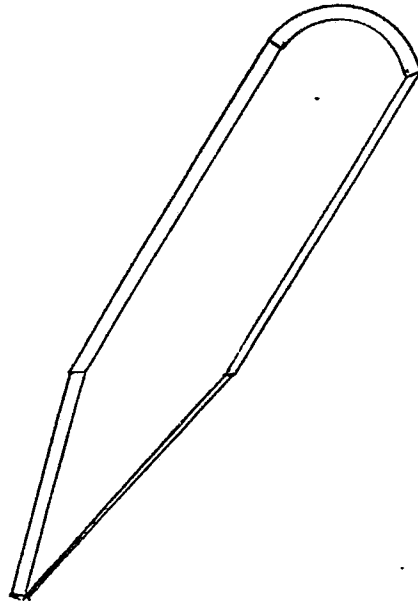
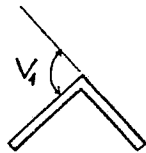
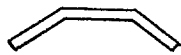


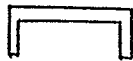
FIG 3



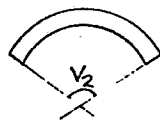
a



b



c



d

FIG 4

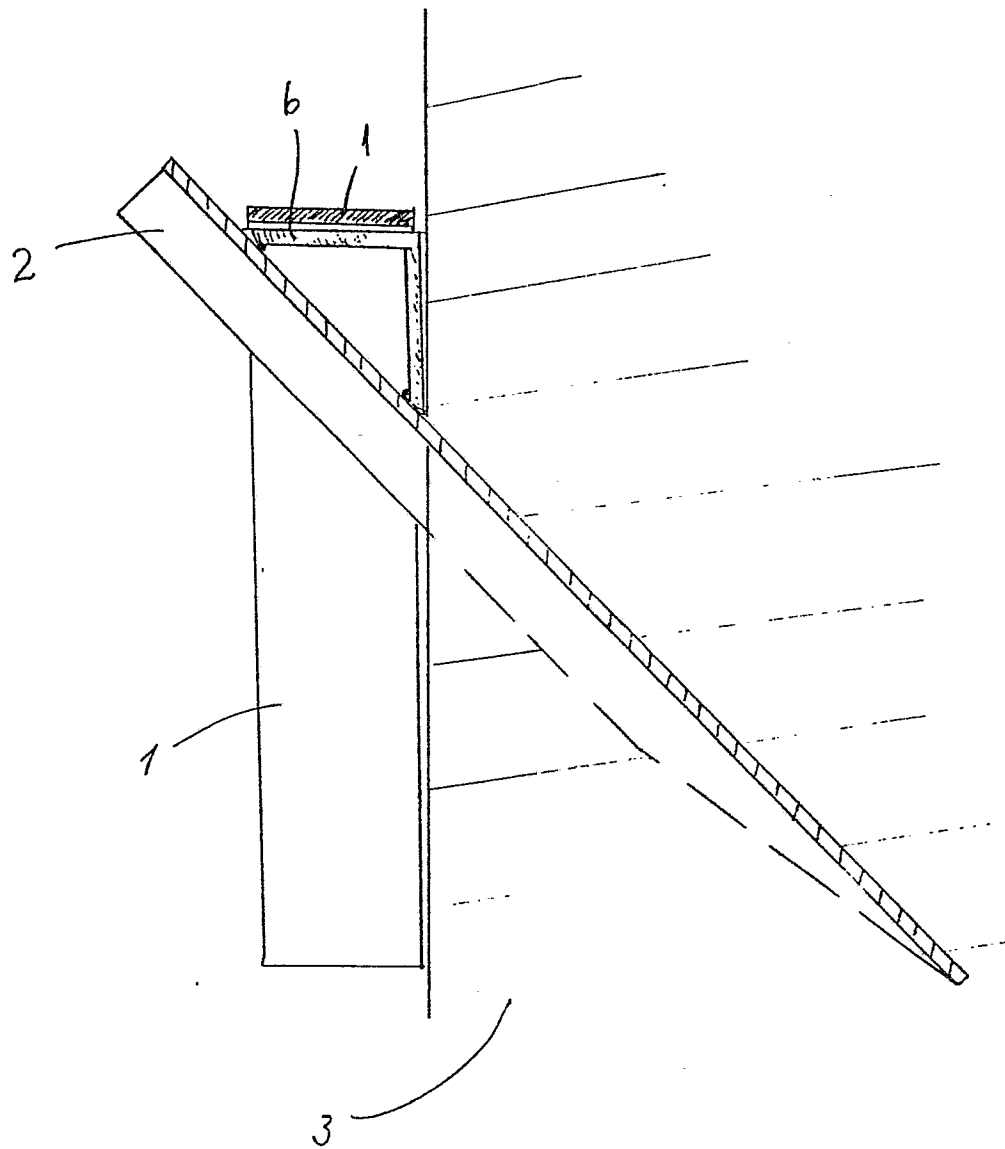


FIG 5