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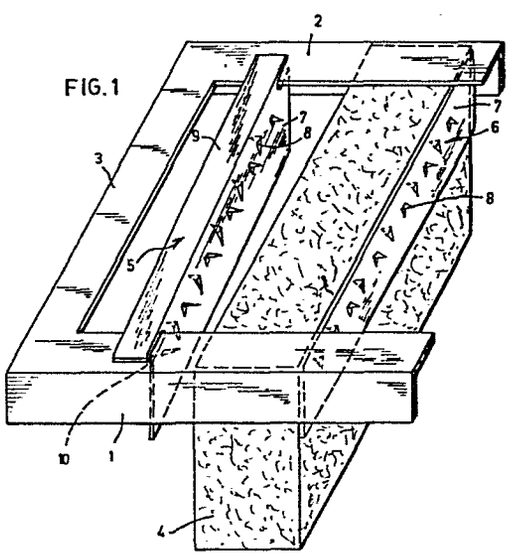
(54) Support or suspension for insulation material.

(57) When coating the inner surfaces of a furnace with strips of refractory mineral material of synthetic material such as felt, one often uses anchors which are welded to the shell of the furnace, which anchors are provided with recesses such that little plates can be secured to the anchor after having made a quater of a revolution. These anchors represent energy loss and it is a time consuming job to weld all those anchors.

This is eliminated by using metal strips (5) with recesses (8) which are punched out to at least one side. One can make now felt packages and some strips are provided with slots (10) so that they can simply be attached to the furnace frame (2). If the side walls are coated by vertical packages, there also is no sag under the influence of the own weight.

FIG.1



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SUPPORT OR SUSPENSION OF INSULATING MATERIAL.

The present invention relates to a support or suspension for insulating material in a furnace, comprising a metal support frame of stainless material and strips of refractory mineral material or synthetic material which are connected to the support frame by the support or suspension.

Furnaces for all sorts of applications, like annealing and testing metals and burning ceramic products, were made of refractory stone, but the expertise which is necessary for the handwork to be performed becomes almost priceless, provided that it is available. Therefore there is a development going on during the last few years to compose said furnaces of other materials than refractory stones. Nowadays as insulating material refractory mineral or synthetic material is considered for use and therefore one speaks of felt furnaces at present.

A considerable problem when securing the refractory felts to particularly the ceilings of such furnaces has not been solved well yet. One often uses anchors, welded to the shell of the furnace, which anchors are provided with recesses such, that after having made a quater of a revolution, the little plates can be secured on the anchor at the correct location. This principle has the disadvantage that a large number of such anchors has to be

provided which increases the cost price of the furnace, whereas moreover can be mentioned as disadvantage, that all said anchors with pertaining little plates will also incur much loss in energy because they can be considered to be so-called heat-bridges.

Tests have been carried out to determine whether the strips of refractory mineral or synthetic material might remain in their places by means of adhering them. This appears not to be so.

The invention tends to improve the above. It appears that this is achieved by still forming the support or suspension of metal, but having it positioned within the surface of the insulating material which is exposed to the heat.

The first embodiment of the invention is characterized in that the support consists of a metal strip which is formed by a plate with recesses, punched out to at least one side. Said recesses may be triangular, so that points are obtained, which protrude to at least one side.

A second possibility is characterized in that the support consists of a metal strip formed by a plate, at least one longitudinal edge of which is crenated or knurled.

When erecting such a furnace at least a plurality of the metal strips will have to consist of a metal plate with folded edge which is shorter than the plate, and the ends of the plate are provided with slots which are defined by the plate and the edge, so that the plate with folded edge can be shifted into the corner profiles of the support frame.

Furthermore the feature can be used that the folded edges of two plates are interconnected, for instance by spot welding.

In view of the fight against corrosion under the influence of the high temperature and moisture, it is preferred to form the metal strips and the support frame of stainless steel.

When all metal strips are formed as metal plate with folded edge, the exterior of the furnace is given a louvre-like appearance.

A furnace, which is provided with the above mentioned supports or suspensions, may be characterized in that the metal strips are arranged vertically along the upwardly directed walls.

This has the considerable advantage with respect to the horizontal arrangement, that lower felt layers will not longer sag under the influence of the weight of felt layers at a higher level.

The invention will be eluciated hereinafter on the basis of the drawing, in which by way of example a plurality of embodiments is shown of a support or suspension according to the invention. In the drawing is illustrated by:

Fig. 1 in perspective a plan view of a metal support frame of a furnace having two embodiments of metal strips therein;

fig. 2 a cross-section with two interconnected metal strips.

fig. 3 and 4 cross-sections of other embodiments of a metal strip, and

fig. 5 a flattened view of a portion of the metal strip of fig. 3.

In the drawing the support frame is symbolized by two parallel corner profiles 1 and 2 which are interconnected by a corner profile 3. The latter corner profile 3 is located anyway in or on

the vicinity of the outer peripheral surface of the furnace, which is not further illustrated, but parallel to the corner profiles 1 and 2 more profiles may extend in the event of larger furnaces.

To said profiles 1 and 2 strips 4 of refractory mineral or synthetic material, like felt, have to be secured and this being done such that by the influence of the high temperatures, accompanied by a considerable moist development, they will not be unintentionally moved from their place, which appears to be a condition which is hard to meet, especially for ceilings of furnaces.

With the invention this is effectively achieved by metal strips 5 and 6, showing two possible embodiments of the invention, which are preferably made of stainless steel.

Both metal strips consist of a rectangular plate 7 with a length which is almost equal to the length of the strip 4 of refractory material, but with a considerably smaller height. The further these plates are away from the high temperature, the less they will function as heat bridge. The height only needs to be just sufficient to be able to punch protrusions 8 of sufficient strength therefrom.

In the illustrated embodiment said protrusions consist of triangular points, which are alternately punched to the one and to the other side of the central area of the plate 7, but they could also consist of rectangles which are punched from the area of the longitudinal edge thereof, so that a crenelled appearance is achieved.

If, as is usual for temperatures to be insulated up to the extent of 1000^{o}C, various of the illustrated strips 4 are placed against

each other then, as will be readily understood, a strong parcel of insulating strips is achieved on the intermediate plates 7, owing to the protrusions.

The connection with the metal support frame, which is particularly important for the insulation of a ceiling of a furnace, is achieved by providing at least a plurality of the plates 7 in the way, as indicated for metal strip 5, with a folded edge 9, which may be shorter than the metal strip, but should be adapted to rest on the profiles 1 and 2. In the plate 7 of the strip 5 a slot 10 is provided at both ends, so that the strip 5 is made slidable, as it were, over the profiles 1 and 2.

With the described and shown suspension it is possible to easily and quickly manufacture a well-fixed furnace lining. The further details, like the relation in which the strips 4 are placed along the walls and in the corners, as well as the special provision for the door and for the burner(s) or electric resistance elements may be left out of discussion here, but it is remarked, though, that the metal strips can now also be placed vertically along the upwardly directed side walls of the furnace so that the felt will not sag under the influence of its own weight.

In the variations as illustrated in fig. 2 the folded edges 9 of two plates 7 are interconnected by spot welds 11, and the distance between the plates 7 corresponds with the thickness of a felt layer. It is striking that the triangular protrusions 8 are turned over 90° relative to fig. 1

As is illustrated in fig. 3-5 the two plates of fig. 2 may also be made integrally and notches 12 may be provided which retain the felt strips 4. Fig. 3 and 5 relate to a square-folded plate 13 and fig. 4 relates to a circle-sector-like folded plate 14, the ends

of which may of course be formed in the same way as shown in fig. 1.

CLAIMS:

1. A support or suspension for insulating material in a furnace, comprising a metal support frame of stainless material and strips of refractory mineral material or synthetic material which are connected to the support frame by the support or suspension, characterized in that the support is positioned within the surface of the insulating material which is exposed to the heat.

2. A support or suspension according to claim 1, characterized in that the support consists of a metal strip (5, 6) formed by a plate (7) with recesses, punched out to at least one side.

3. Support according to claim 1, characterized in that the support consists of a metal strip (5) formed by a plate (13, 14), at least one longitudinal edge of which is crenated or knurled (such as at 12).

4. A support or suspension according to claim 2, characterized in that the recesses are triangular, so that points (8) are obtained, which protrude to at least one side.

5. A support or suspension according to any of the claims 1-3, characterized in that the metal plate (5) has a folded edge which is shorter than the plate, and in that at the ends of the

plate slots (10) are provided which are defined by the plate (7) and the edge (9), so that the plate with folded edge can be shifted into corner profiles (1, 2) of the support frame.

6. A support or suspension according to claim 5, characterized in that the folded edges (9) of two plates (7) are interconnected, for instance by spot welding (11).

7. A support or suspension according to any of the preceding claims, characterized in that the metal strip and the support frame are made of stainless steel, whereas the insulating material consists of felt.

8. A furnace with a support or suspension according to any of the preceding claims, characterized in that the metal strips (5, 6) are arranged vertically along the upwardly directed walls.

9. A support or suspension as illustrated in the drawing and/or discussed on the basis thereof.

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FIG. 1

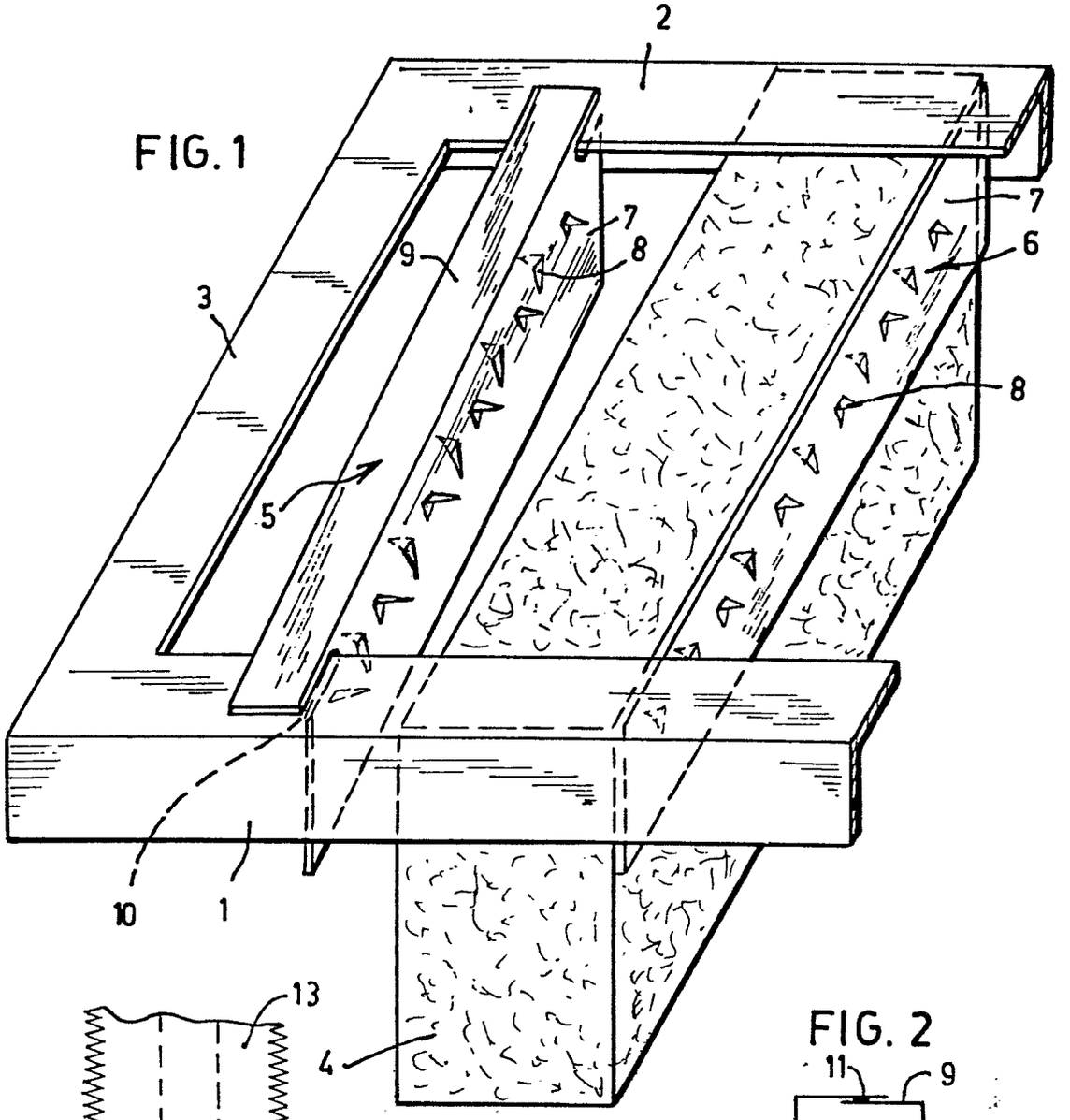
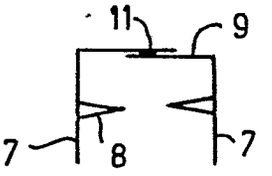


FIG. 2



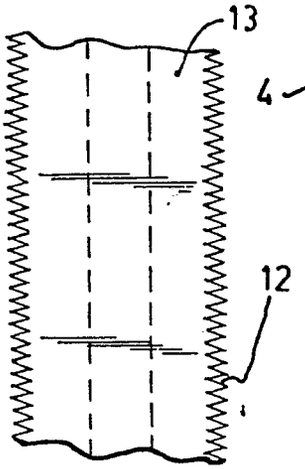


FIG. 5

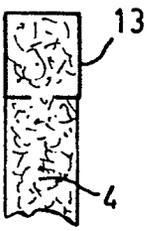


FIG. 3

FIG. 4

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EUROPEAN SEARCH REPORT

0061537
Application number
EP 81 20 0346

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int Cl.³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	GB - A - 1 128 877 (THE BABCOCK & WILCOX CY.) * Claims, figures * --	1,2,4	F 27 D 1/02 F 27 D 1/14
	US - A - 2 991 060 (SKLENAR) * Claim 1; figures 7-11 * --	1	
	US - A - 2 940 017 (WOLF) * Claim 1; figures * --	1	TECHNICAL FIELDS SEARCHED (Int. Cl.³)
	GB - A - 1 161 272 (OSTERREICHISCH-AMERIKANISCHE MAGNESIT A.G.) * Claims; figures * --	1	F 27 D F 23 M
	US - A - 3 172 171 (KNIGHT) * Claims 1-6; figures * -----	2,4	

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

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	26-10-1981	COULOMB

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