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(54) Method for manufacturing a cast iron pan support frame and pan support frame thereby obtained.

(57) The invention relates to a method for manufacturing a cast iron pan support frame comprising a frame and a number of elongate, inward facing pan carriers moulded on that frame, which method comprises the following steps:
the providing of a casting mould with a mould cavity adapted to the form of the pan support frame for manufacture, but wherein the parts corresponding to the pan carriers have a greater length than the pan carriers,
the filling of the casting mould with heated, liquified cast iron,
the subjecting of the casting mould to cooling below the melting point or range of the cast iron,
the release of the raw casting from the casting mould and the removal of the free end portion of each pan carrier.

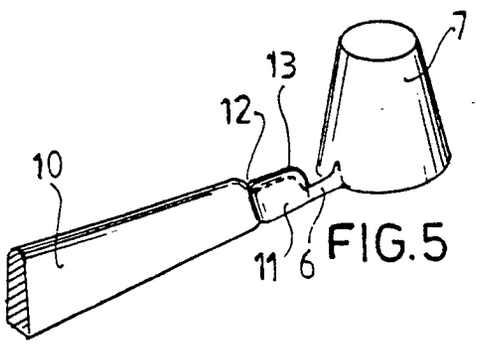

FIG.5

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Method for manufacturing a cast iron pan support frame and pan support frame thereby obtained

The invention relates to a method for manufacturing a cast iron pan support frame comprising a frame and a number of elongate, inward facing pan carriers moulded on that frame, which method comprises the following steps:
the providing of a casting mould with a mould cavity the form of which is adapted to the form of the pan support frame for manufacture,
the filling of the casting mould with heated, liquified cast iron,
the subjecting of the casting mould to cooling below the melting point or range of the cast iron, and
the release of the raw casting from the casting mould.

Such a pan support frame serves to carry pans on a gas cooker. The free end portions of the elongate pan carriers are greatly heated by the gas flames produced by the burner. Such localized heating must be avoided as much as possible in order to preserve to the best possible extent the quality of the cast iron and the normally present enamel coating layer. With a view to this the round burners are usually formed such that there is no flame in the area of the elongate pan carriers so that no extreme requirements have to be met as to the heat resistance of these pan carriers.

In order to be able to enamel a raw casting well the surface has to undergo a roughening pre-treatment. A problem with the known method is that the cast iron at the free ends of the pan carriers has such a great hardness on the surface that it is difficult to roughen without this affecting the surrounding softer material. This harder zone is designated as the "white solid" or the "white nail". A further problem here is that particularly the modern, lighter coloured enamel types adhere very badly to this material. The white solid also has the drawback of possessing a comparatively poor heat resistance.

Pan support frames can be tested with a standardized thermal shock test. The pan support frame is thereby heated to a temperature of 420 degrees and subsequently cooled in cold water, a cycle repeated four times. Also carried out is a test with long duration heating having longer heat-cold cycles. The known pan support frames are not generally capable of meeting the requirements, particularly of the thermal shock test. It has thus been found in practice that the enamel on the points of the pan carriers comes off quickly, which is unacceptable.

The use is known of pan carriers of steel wire. It is known that steel wire is a homogeneous material, that is, it possesses virtually the same characteristics throughout, so that in this case the problem does not occur.

The current invention relates however to cast iron pan support frames that are required when an option is made for more freedom of form than is made possible by steel wire and when moreover a costly welding process is not desired.

The invention has for its object to perform a method for manufacturing a cast iron pan support frame such that the technical advantages of the cast iron pan support frame and those of a pan support frame with steel wire pan carriers are combined.

In order to achieve this purpose the invention proposes a method of the kind referred to in the preamble characterized by the following steps:
the providing of a casting mould with a mould cavity of which the parts corresponding with the pan carriers have a greater length than the pan carriers, and
the removal of the free end portion of each pan carrier.

In general the basic concept behind the invention is that cast iron can be allowed to flow on further than the final length of the pan carriers. The extra portion with the white solid can then be removed. The above stated problems are thereby solved, or at least considerably lessened. Removal of the free end portion of the pan carriers may be performed by sawing or grinding.

Preference is given in accordance with the invention to a method characterized by the following steps:
the providing of a casting mould with a mould cavity, of which the parts corresponding with the pan carriers comprise:
- a first part, the length of which is equal to the desired length of a pan carrier, and the form of which is the same as the desired form of this pan carrier,
- a narrowed second part connecting thereto, and
- a third part in the form of a cavity connecting thereto,
the removal of the free end portion of each pan carrier formed in the second part and the third part.
With this method the "white nail" is made considerably smaller, but may still be present in small measure.

In a preferred embodiment of the method according to the invention the following steps are applied:
the providing of a casting mould of which the first part and the second part connect to each other via a narrowed portion such that in each pan carrier of a raw casting a constriction is present between the

respective parts corresponding with the first part and the second part, and
the exerting of a bending moment on the parts of the raw casting corresponding with the first and second parts, such that the second part breaks off the first part. The second part is preferably broken off the first part by means of a hammer or other instrument suitable for this purpose. This latter method in particular has been found in practice to be completely adequate for a virtually complete homogeneity of the cast iron of the shaped pan support frame. The thermal shock test can be withstood excellently up to a temperature of 500 ° C.

Should the shape of the pan support frame obtained make it desirable, an additional minor finishing process may then be carried out, for example to give sharp edges a more flowing form. A grinding treatment is very suitable for this purpose. This can be performed for instance by an industrial robot.

The invention further extends to a pan support frame, comprising a frame and a number of elongate, inward facing pan carriers moulded on that frame, which pan support frame is obtained by employing one of the above mentioned methods according to the invention.

The invention will now be elucidated with reference to the drawing, in which:

Fig. 1 shows an embodiment of a pan support frame in perspective view;

fig. 2 is a pan carrier as in fig. 1;

fig. 3 is the cross section III-III from fig. 2;

fig. 4 shows a pan carrier of a raw casting obtained with a first embodiment of the method according to the invention;

fig. 5 is a view corresponding with fig. 4 of a pan carrier obtained with a second embodiment of the invention; and

fig. 6 shows a schematic view of the breaking of the second and third part off the first part.

Fig. 1 shows a cast iron pan support frame 1 comprising in this case a square frame 2 and four elongate, inward facing pan carriers 3 moulded on that frame 2. Pan support frame 1 is manufactured from cast iron using a casting mould with a mould cavity, the form of which corresponds accurately with that of pan support frame 1.

Fig. 3 shows the point of pan carrier 3. Found in the narrower upper portion of this point is a nail-like zone 4 in which the cast iron has a different crystalline structure than in the rest of pan support frame 1. This is the white nail or white solid and is shown in cross section in fig. 2.

Fig. 4 shows a pan carrier 5, a portion 6 connecting thereto which in turn bears an enlarged portion 7. It will be found in this case that the white solid designated with 8 is considerably less great than in the case of the pan carrier 3 as according to figures 1, 2 and 3. With the removal of the parts 6 and 7 of pan carrier 5 along the broken line 9 a pan carrier 5 of reasonable quality is obtained, although it is still capable of improvement.

Fig. 5 shows a pan carrier 10 to which a second part 11 and the enlarged portion 7 connect via a constriction 12. In this case the constriction extends peripherally. The white nail 13 is now located only in the second part 11.

Fig. 6 shows that as a result of a blow in the direction of arrow 14 on enlarged portion 7 the parts 11 and 7 are together separated from pan carrier 10. The constriction 12 serves in this treatment as notch, or weak point, at which the raw casting breaks when an excessive bending moment is exerted.

Not drawn is that if required the various edges of pan carrier 10, particularly those of end face 15, can be made still smoother by a finishing treatment. This can be performed for instance by grinding.

After finishing the pan support frame in this way the surface can be roughened by shot blasting or the like. A rougher surface has the advantage that enamel adheres better to it.

With the pan support frame according to the invention use can be made of even the most modern, light coloured enamel types while preserving extremely high resistance to heat.

Claims

1. Method for manufacturing a cast iron pan support frame comprising a frame and a number of elongate, inward facing pan carriers moulded on that frame, which method comprises the following steps:
the providing of a casting mould with a mould cavity the form of which is adapted to the form of the pan support frame for manufacture,
the filling of said casting mould with heated, liquified cast iron,
the subjecting of said casting mould to cooling below the melting point or range of the cast iron, and
the release of the raw casting from said casting mould,
characterized by the following steps:
the providing of a casting mould with a mould cavity of which the parts corresponding with the pan carriers have a greater length than the pan carriers, and
the removal of the free end portion of each pan carrier.

2. Method as claimed in claim 1, **characterized by** the following steps:
the providing of a casting mould with a mould cavity, of which the parts corresponding with the pan carriers comprise:
- a first part, the length of which is equal to the desired length of a pan carrier, and the form of which is the same as the desired form of this pan carrier,
- a narrowed second part connecting thereto, and
- a third part in the form of a cavity connecting thereto,
the removal of the free end portion of each pan carrier formed in said second part and said third part.

3. Method as claimed in claim 2, **characterized by** the following steps:
the providing of a casting mould of which the first part and the second part connect to each other via a constriction such that in each pan carrier of a raw casting a constriction is present between the respective parts corresponding with the first part and the second part, and
the exerting of a bending moment on said parts of the raw casting corresponding with the first and second parts, such that said second part breaks off said first part.

4. Method as claimed in claim 3, **characterized by** the following step:
the striking of the second part off the first part.

5. Method as claimed in any of the foregoing claims, **characterized by** the following step:
the finishing to the desired form of each pan carrier, for example by grinding.

6. Cast iron pan support frame, comprising a frame and a number of elongate, inward facing pan carriers moulded on that frame, which pan support frame is obtained by employing a method as claimed in any of the foregoing claims.

FIG. 1

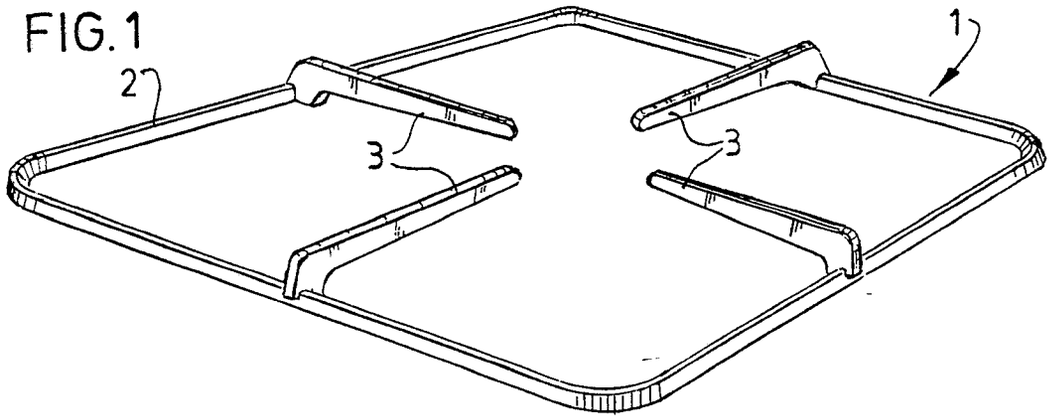

FIG. 3

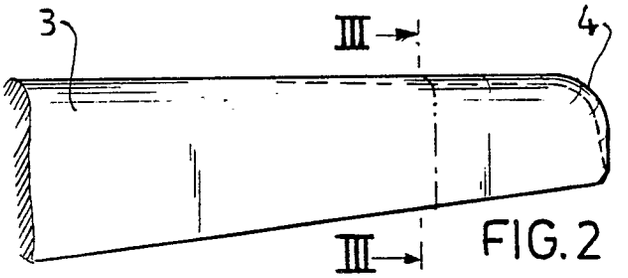

FIG. 2

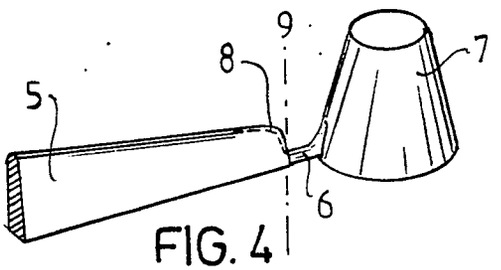

FIG. 4

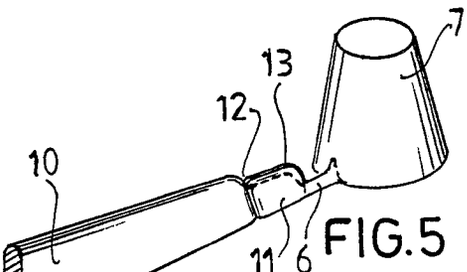

FIG. 5

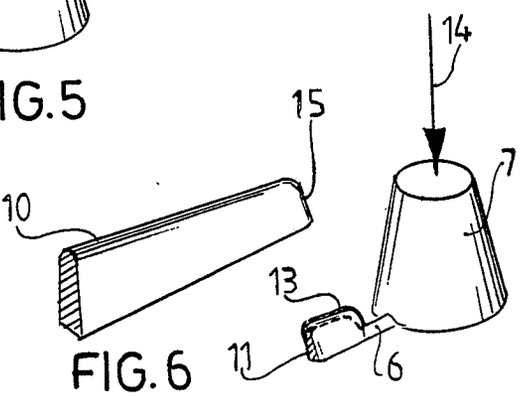

FIG. 6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 88 20 0743

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)
E	NL-A-8 603 323 (LOVINK TERBORG B.V.) * Whole document *	1-6	B 22 D 25/08 F 24 C 15/10
Y	DE-C- 708 786 (AKOMFINA AG) * Whole document *	1,5,6	
Y	DE-C- 105 724 (A. LICHTENBERG) * Whole document *	1,5,6	
A	FR-A-1 135 004 (SOCIETE GENERALE DE FONDERIE)		
A	NL-A-7 808 955 (ETNA B.V.)		
A	DE-A-2 634 578 (HEIDE OTTO) * Figures; page 4, lines 1-26 *	3,4	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 22 D
F 24 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	15-11-1988	MAILLIARD A.M.

CATEGORY OF CITED DOCUMENTS

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