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(72) Inventors:
• **Van der Woude, Dirk Cornelis**
6971 BC Brummen (NL)
• **Niermeijer, Jochem**
1941 JA Beverwijk (NL)

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(74) Representative: **Kruit, J., Ir. et al**
Corus Technology BV
PO Box 10000
1970 CA IJmuiden (NL)

(71) Applicant: **Corus Staal BV**
1970 CA IJmuiden (NL)

(54) **Plate for supporting pipes of a thermal wall, and thermal wall and method for its production**

(57) The invention relates to a plate for supporting one or more pipes of a thermal wall.

According to the invention, the plate is made of profiled, heat-conducting thin plate material that is shaped in such a way that the plate is self-supporting, the plate having one or more grooves in order to accommodate the one or more pipes of the thermal wall, the grooves being of substantially the same depth as the diameter of the pipes, and the pipes being accommodated in a press fit in the grooves.

The invention also relates to a thermal wall in which such a plate is accommodated, and to a method for producing a thermal wall.

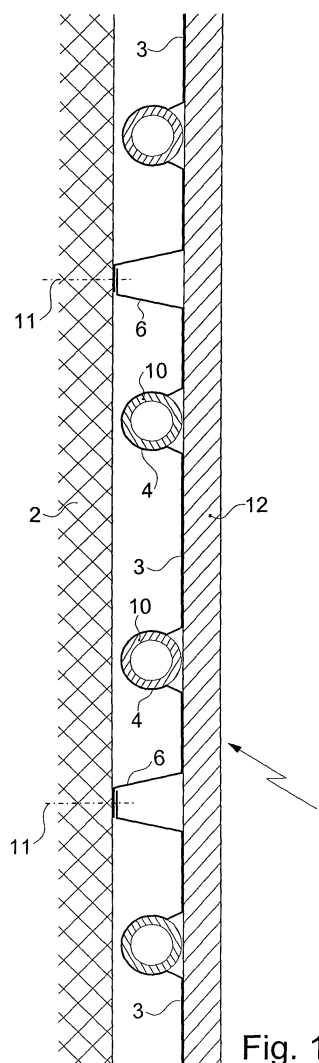


Fig. 1

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Description

[0001] The invention relates to a plate for supporting one or more pipes of a thermal wall. The invention also relates to a thermal wall in which such a plate is accom-

[0002] Thermal walls are used to heat or cool a room in a house or an office. In this case pipes are accommodated in the wall or walls of the room, through which pipes liquid (generally water) is conveyed, the liquid being heated when the room has to be heated, and the liquid being cooled when the room has to be cooled. Only heating will be mentioned below, but cooling can also be meant.

[0003] A thermal wall is an advantageous way of heating, because a large surface is available. The liquid need not be hot, which is advantageous as regards energy, particularly where new heating systems, such as heating with the aid of solar energy, heat pumps, groundwater and the like, are being used. Furthermore, radiation from a large surface with a low temperature is found to be pleasant.

[0004] A disadvantage of the known thermal walls is that they are significantly more expensive than conventional central heating by means of radiators.

[0005] It is an object of the invention to provide a thermal wall that is only slightly more expensive than conventional heating, and is preferably even cheaper.

[0006] It is another object of the invention to provide a thermal wall that is simpler to fit than known thermal walls.

[0007] It is further an object of the invention to provide a plate for supporting the pipes of a thermal wall that is cheap to produce.

[0008] It is also an object of the invention to provide a plate for supporting the pipes of a thermal wall that is simple to produce.

[0009] According to a first aspect of the invention, a plate for supporting one or more pipes of a thermal wall is provided, the plate being made of profiled, heat-conducting thin plate material that is shaped in such a way that the plate is self-supporting, the plate having one or more grooves in order to accommodate the one or more pipes of the thermal wall, the grooves being of substantially the same depth as the diameter of the pipes, and the pipes being accommodated in a press fit in the grooves.

[0010] By using a plate of profiled thin plate material, it is possible to produce the plate relatively easily as a prefabricated product, for example by cold rolling, as a result of which a light plate that is easy to fit on the wall is produced. By making the plate self-supporting, the plate can be fixed on the wall without further support, and pipes can be accommodated in it and finishing materials such as plasterboard panels can be fixed on it. It is therefore not necessary to fit a layer of supporting material such as strips of wood underneath the plate, nor does the plate have to be sandwiched between an in-

sulating layer and a finishing layer in order to fix the plate.

[0011] By making grooves in the plate, the pipes can be accommodated in the plate, so that the finishing material can be fitted directly against the flat parts of the plate. This is advantageous for making the finishing material assume the temperature of the plate. The grooves are of substantially the same depth as the diameter of the pipes, because this means that the total thickness of the profiled plate can be kept as low as possible. The grooves are shaped in such a way that the pipes can be accommodated in them in a press fit, so that after fitting in the plate fixed on the wall the pipes do not fall out of the plate, and no additional fixing means such as adhesive is required to accommodate the pipes in the plate. The press fit of the pipes in the grooves also improves heat transfer between the pipes and the plate.

[0012] In addition, the self-supporting plate can make a constructive contribution to various substrates, such as, for example, in steel and wooden skeleton constructions. The plate in that case gives increased strength to and has a stabilizing effect on the substrate.

[0013] Although a thermal wall for heating or cooling a room is spoken of above, the system could also be fixed to the ceiling, or could even be fitted on the floor. That does not make any difference to the plate according to the invention.

[0014] The plate is preferably made of metal plate, more preferably of steel plate or aluminium plate. Metal plate has good heat-conducting properties, and steel plate and aluminium plate are relatively cheap and easy to shape.

[0015] The plate preferably has a thickness of 0.5 - 2.0 mm, more preferably a thickness of 0.6 - 0.7 mm for steel plate. A thickness of 0.5 - 2.0 mm is adequate to give the plate sufficient strength and rigidity, while the weight of the plates will not be too great for easy fitting of the plates on a wall. In addition, such thicknesses are easy to process for profiling of the plates. In the case of these thicknesses the plates are in any case self-supporting when they have been profiled. A thickness of 0.6 - 0.7 mm is sufficient when the plate is made of steel plate.

[0016] The plate preferably has one or more grooves and/or one or two flanges in order to fix the plate against a wall. This means that the plate is easy to fix on the wall with fixing means such as screws, without additional clamps or other retaining means being necessary. The grooves and/or flanges also provide the plate with additional rigidity, which helps to make the plate self-supporting. This also applies to the grooves for the pipes.

[0017] According to a preferred embodiment, the plate has two or more grooves for accommodating the pipes for the thermal wall in a press fit, and the plate has two flanged edges for fixing the plate against a wall. In the case of this preferred embodiment the plate is fixed on the wall by means of the flanged edges, and the

grooves for the pipes will extend between said flanged edges, preferably being parallel. The plate is then relatively simple to produce by cold rolling, owing to the fact that the flanged edges are easy to produce. Two or more grooves per plate means that for each plate a sufficiently large surface of the wall can be provided with pipes, so that a thermal wall can be fitted quickly.

[0018] According to a second aspect of the invention, a thermal wall for fixing against a wall is provided, which thermal wall comprises one or more plates according to the first aspect of the invention, one or more pipes for heating or cooling the wall, and covering material placed on the one or more plates.

[0019] Said thermal wall has the great advantage that the thermal wall is simple to construct, owing to the fact that only profiled plates according to the invention, pipes and covering material are necessary, plus fixing means such as, for example, screws, nails or rivets. An additional support of the profiled plate is not necessary, because the plate is self-supporting.

[0020] According to a preferred embodiment, insulating material is fitted against the plate on the side of the plate facing the wall. This ensures that when the room in which the thermal wall is fitted heats up a greater part of the heat from the pipes will benefit the room. By fitting the insulating material against the side of the plate facing the wall, it is ensured that the insulating material can be fitted against the plate already before the thermal wall is mounted, and this fitting does not need to be carried out during the mounting of the wall. The insulating material therefore does not need to be fitted against the wall itself.

[0021] According to another preferred embodiment, the space between the plate and the wall is filled with insulating material. This gives the best insulation of the room to be heated, without the thermal wall becoming thicker. Here again, the insulating material can be fitted against the profiled plate beforehand, therefore giving a prefabricated product, so that no additional operations are needed during mounting, with the result that no additional time is needed for insulation of the wall.

[0022] According to a third aspect of the invention, a method is provided for the production of a thermal wall, in which one or more plates according to the first aspect of the invention are fixed against a wall with the aid of fixing means, after which one or more pipes are accommodated in the plates and covering material is subsequently fitted over the plates and the pipes.

[0023] These are the only steps that have to be taken to mount the thermal wall according to the invention. Through use of the profiled plate according to the first aspect of the invention, it is thus possible to provide a simple and consequently quick method of producing a thermal wall, which is therefore also economically advantageous to use.

[0024] According to one embodiment of the invention, insulating material is fitted between the one or more plates and the wall before or after fixing of the one or

more plates. In this way better insulation of the wall on which the thermal wall is fitted is obtained, which is desirable particularly in the case of exterior walls of a house, an office or another building. Of course, it is advantageous to fit insulating material prior to the fixing of the plates, and to fit it against the plates themselves, so that said plates can be fixed easily and simply to the wall.

[0025] The invention will be explained on the basis of an exemplary embodiment with reference to the appended drawing.

[0026] Figure 1 shows diagrammatically a cross section of an embodiment of a thermal wall according to the invention, fixed against a wall.

[0027] Figure 2 shows a part of Figure 1 on a larger scale.

[0028] Figure 1 shows in cross section an embodiment of a thermal wall 1 according to the invention fixed against a wall 2. The thermal wall 1 consists of profiled plates 3, in which pipes 10 are accommodated. The profiled plates 3 and the pipes 10 are covered by means of covering material 12 in order to conceal the plates and pipes and to give the wall provided with the thermal wall an attractive appearance. The profiled plates 3 are fixed to the wall 2 with the aid of fixing means 11, such as screws, which are shown only diagrammatically as dashed and dotted lines.

[0029] The profiled plates 3 are self-supporting, which means that no additional support is needed to support the plates 3. Owing to the choice of material and the thickness of the material, and to the chosen profiling, the plates are sufficiently strong and rigid to withstand deformation after fixing against the wall 2, to enable them to support pipes 10 in them, and to permit covering material 12 to be fixed against them.

[0030] The profiled plates 3 have grooves 4 for accommodating the pipes 10, and have flanged edges 6, 7 for fixing the profiled plates against the wall. The grooves 4 are shaped in such a way that the pipe 10 fits into them in a close-fitting manner, so that the inside diameter d of the groove is equal to the outside diameter of the pipe 10. The grooves are preferably shaped in such a way that the pipe does not project beyond the plate 3, but ultimately lies in exactly the same plane (see Figure 2). This means that the depth h of the grooves 4 must be equal to the outside diameter of the pipe 10. In order to be able to accommodate the pipe 10 in a press fit in the groove 4, the aperture a must be slightly smaller than the outside diameter of the pipe 10, but the aperture b of the groove must be just slightly larger than the outside diameter of the pipe 10, so that the pipe 10 can easily be pressed into the groove 4. In this case a bevel 5 between the aperture a and the aperture b is desirable.

[0031] At the edges of the plate 3 which run parallel to the grooves 4, the plate has a flanged edge 6, 7, by means of which the plate can be fixed against an existing wall. The distance g is preferably only slightly greater than the depth of the groove 4, so that the thermal wall remains as thin as possible. However, if it is desired also

to provide good insulation with the aid of the thermal wall, a greater distance g can be chosen. The width f is adapted to the fixing means required.

[0032] According to an example in terms of figures, the pipes have an outside diameter of 16 mm, so that the grooves 4 also have an inside diameter of 16 mm, and the depth h of the grooves is preferably 16 mm. The aperture a can then be 15 mm, and the aperture b 17 mm. For the distance g for the total thickness of the plate, 18 mm can then be chosen, and 10 mm can be chosen for the width of the fixing flange 7. The total width of the plate can be, for example, approximately 330 mm. For the plate 3 itself, it is possible to choose, for example, steel plate with a thickness of 0.6 - 0.7 mm.

[0033] The pipe 10 can be fitted in a spiralling shape against a wall, it being possible for the bends to project beyond the plates 1 fitted against the wall 2. It is possible for the pipes 10 to be made of plastic hose, but it is also possible to make the pipes of steel tubing. Plasterboard can be chosen as the covering material 12, but other materials can also be used as the covering material.

[0034] It is possible to fit an insulating material between the wall 2 and the plates 3. Since the plates 3 are self-supporting, this insulating material does not require any rigidity and strength, as is often customary in the case of other thermal wall systems. The insulating material is preferably fitted in prefabricated form against the side of the plates 3 that are to face the wall 2, so that the plates 2 with the insulating material can be fitted easily and quickly against the wall 2 and no additional actions are necessary.

[0035] It will be clear that the embodiment of the plate 3 described above is only a preferred embodiment, and that other embodiments are also possible. For example, it will be possible to shape the grooves 4 differently.

4. Plate according to one of the preceding claims, in which the plate has one or more grooves and/or one or two flanges in order to fix the plate against a wall.

5. Plate according to one of the preceding claims, in which the plate has two or more grooves for accommodating pipes for the thermal wall in a press fit, and the plate has two flanged edges for fitting the plate against a wall.

6. Thermal wall for fixing against a wall, comprising one or more plates according to one of the preceding claims, one or more pipes for heating or cooling the wall, and covering material fitted on the one or more plates.

7. Thermal wall according to claim 6, in which insulating material is fitted against the plate on the side of the plate facing the wall.

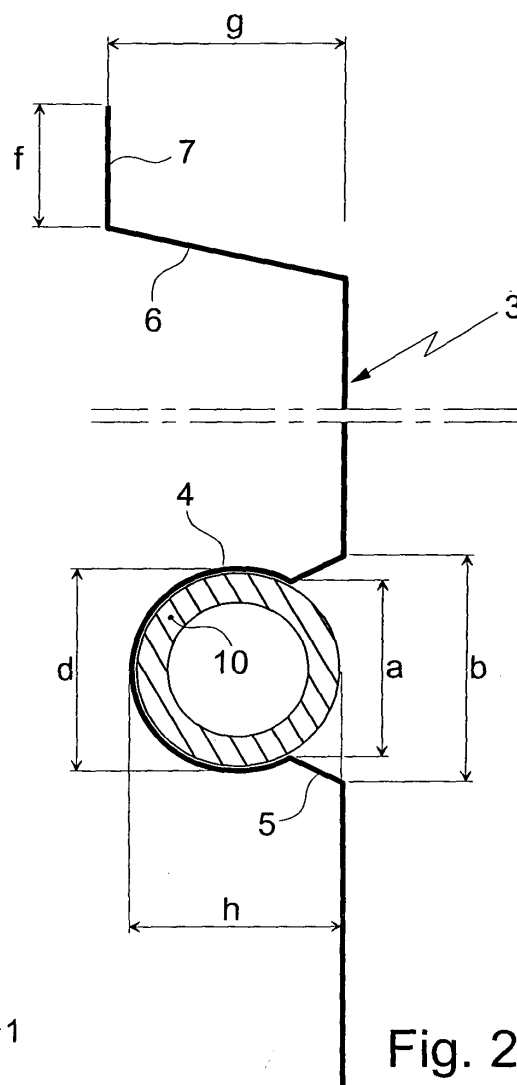
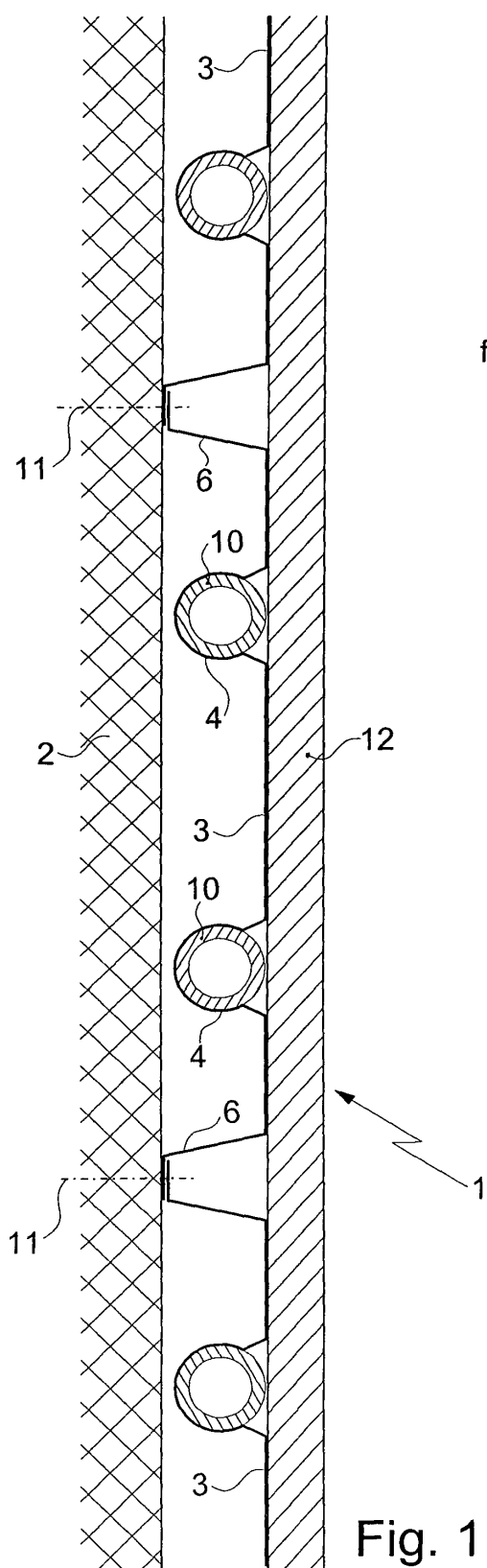
8. Thermal wall according to claim 6, in which the space between the plate and the wall is filled with insulating material.

9. Method for producing a thermal wall, in which one or more plates according to one of claims 1 - 5 are fixed against a wall with the aid of fixing means, after which one or more pipes are accommodated in the plates and covering material is subsequently fitted over the plates and the pipes.

10. Method according to claim 9, in which insulating material is fitted between the one or more plates and the wall before or after fixing of the one or more plates.

Claims

1. Plate for supporting one or more pipes of a thermal wall, **characterized in that** the plate is made of profiled, heat-conducting thin plate material that is shaped in such a way that the plate is self-supporting, the plate having one or more grooves in order to accommodate the one or more pipes of the thermal wall, the grooves being of substantially the same depth as the diameter of the pipes, and the pipes being accommodated in a press fit in the grooves.
2. Plate according to claim 1, in which the plate is made of metal plate, preferably of steel plate or aluminium plate.
3. Plate according to claim 1 or 2, in which the plate has a thickness of 0.5 - 2.0 mm, preferably a thickness of 0.6 - 0.7 mm for steel plate.





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EUROPEAN SEARCH REPORT

Application Number
EP 03 07 8690

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.CI.7)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		17 February 2004	Van Gestel, H
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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