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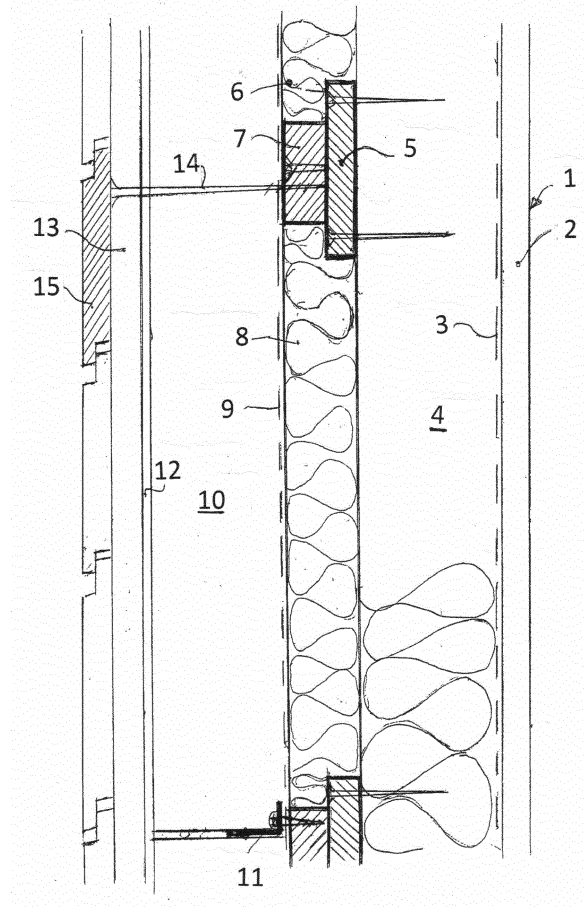
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(54) **METHOD FOR RETROFIT INSULATION OF A WALL**

(57) A method of post-insulation of existing wall (1), which method comprises the following steps:  
any cladding and windbreaker on the wall (1) is removed;  
spacers (5) are attached to the wall (1) at predetermined intervals, wherein the thickness of the spacers is sought adapted so that their outer surface (6) remains in the same vertical plane;  
horizontal rails (7) are attached to the spacers (5) by mutual vertical distance; the spaces formed between the rails (7) and the wall (1) are filled with a vapour-open insulation (8); and plates (10) of highly insulating material are placed against the rails (7) and being attached thereto, wherein the insulation properties of the wall (1), the vapour-open insulation (8) and the plates (10) are adapted to each other so that condensation against the plates of any water vapour present, is avoided on cold days.



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## Description

[0001] The present invention relates to a method of post-insulation of exterior walls in commonly occurring houses.

[0002] "Etterisolering av småhus" (Post-insulation of small houses), SINTEF Academic Press, 2017, provides a comprehensive introduction to the various methods that can be used for post-insulation of the many wall types that have been used during the last hundred years. However, the book contains little about transport of vapour through the insulation.

[0003] Vapour can enter a wall when the vapour pressure (the partial pressure) of the air inside seeks to find its way out towards the cold side of the wall. This can be done by diffusion through inner cover and foils, and through cracks and tears in the inner surface. This moisture must then be released into the open so as not to damage the wall.

[0004] The present invention concerns the rehabilitation of existing wooden walls, post-insulation of walls and protection against moisture damage. The invention is further defined in the subsequent patent claims.

[0005] Exterior panels, plates and any lining of the existing wall will be removed. Diffusion-open cardboard may be mounted over the exposed insulation in the existing wall so that it is not wetted by precipitation during the construction process. Spacers are mounted on the existing wall as a basis and adjustment for a support of the new post-insulation to be mounted. These spacers function to give the wall the largest possible volume of mineral wool, so that the transport of water vapour is as efficient and unhindered as possible, and that the thermal insulation is as good as possible. The volume between the supporting elements is filled with vapour-open mineral wool. The mineral wool is protected from precipitation and moisture with diffusion-open cardboard. Plates with high-insulating foamed plastic are attached to the support with washers and screws. As a final finish, the wall is given a cladding or a layer of plaster and fiberglass cloth. Together, this gives the wall a robust surface.

[0006] This solution provides the wall with defined pathways and means for the evacuation of water vapour that may enter into the wall, during and after rehabilitation. The invention may include four paths, two paths in a horizontal direction and two vertically. The support, which may be of wood, is arranged a distance from the existing wall. Pieces of wood serve to adjust and straighten the support, and to provide said distance. In order to release vapour at the top and bottom edge of a window, the window may be placed in a retracted position from the external insulation plate, for example 20 mm. In this way, the water vapour may be given a free path from the vapour equalisation layer between the plate and the existing wall and out to open air. The same openings may be arranged at the foundation wall and roof. On the way out into open air, the insulating ability of the outer plate ensures that condensation of water vapour does not oc-

cur against the plate even on cold days. This is achieved in that the insulation properties of the wall, the vapour-open insulation and the plate are adapted to each other so that the temperature on the inside of the plate becomes relatively high throughout most of the year.

[0007] The prerequisite for the wall to function according to the requirements, is that the existing wall has a well-functioning diffusion-preventing foil, cardboard or plate under the interior panel. If the diffusion barrier is missing, it can be mounted on the outside of the existing wall. The insulation in the existing wall must then be reduced or removed. Thus, the temperature is kept high in the existing wooden wall, while at the same time the relative humidity is kept low, and rotting is avoided.

[0008] For a better understanding of the invention, it shall be described in more detail with reference to an example of an embodiment supported by the attached drawing. The drawing shows a vertical section through a wall provided with an additional insulation following a method according to the invention.

[0009] The figure shows an existing wall 1, such as a timber framing, which on the inside has a gypsum board 2 and a vapour barrier 3. Inside the vapour barrier, the original insulation 4 is located, for example 10 cm mineral wool. Any existing panelling and windbreaker have been removed.

[0010] Spacers 5 are attached to the framework of the wall (not shown), here in the vertical direction in the form of elongated wooden blocks screwed into the framework. The thickness of the blocks is individually adjusted so that their outer surface 6 remains in the same vertical plane, in order to even out any irregularities in the surface of the existing wall. Horizontal supporting elements 7 are attached to the blocks, here in the form of rails of wooden material. Vapour-open insulation material 8, such as mineral wool, is placed in the spaces between the supporting elements 7 and the insulation 4, and a windbreaker 9 or similar is placed on top of the insulation material 7, in order to, *inter alia*, keep the insulation in place and protect it from the elements during further work on the invention.

[0011] In the next step, plates 10 of highly insulating material, such as PIR, are placed against the windbreaker 9 and supported at the bottom by plate angles 11. The plates have or will receive a 9 mm gypsum board 12 on the outside and are restrained by laths 13, which are attached to the supporting elements 7 using screws 14. The laths form aeration and attachment for an exterior cladding panel 15.

[0012] It will be understood that the invention is not limited to the embodiment described above, but may be varied and modified according to the following patent claims and equivalents thereof.

## Claims

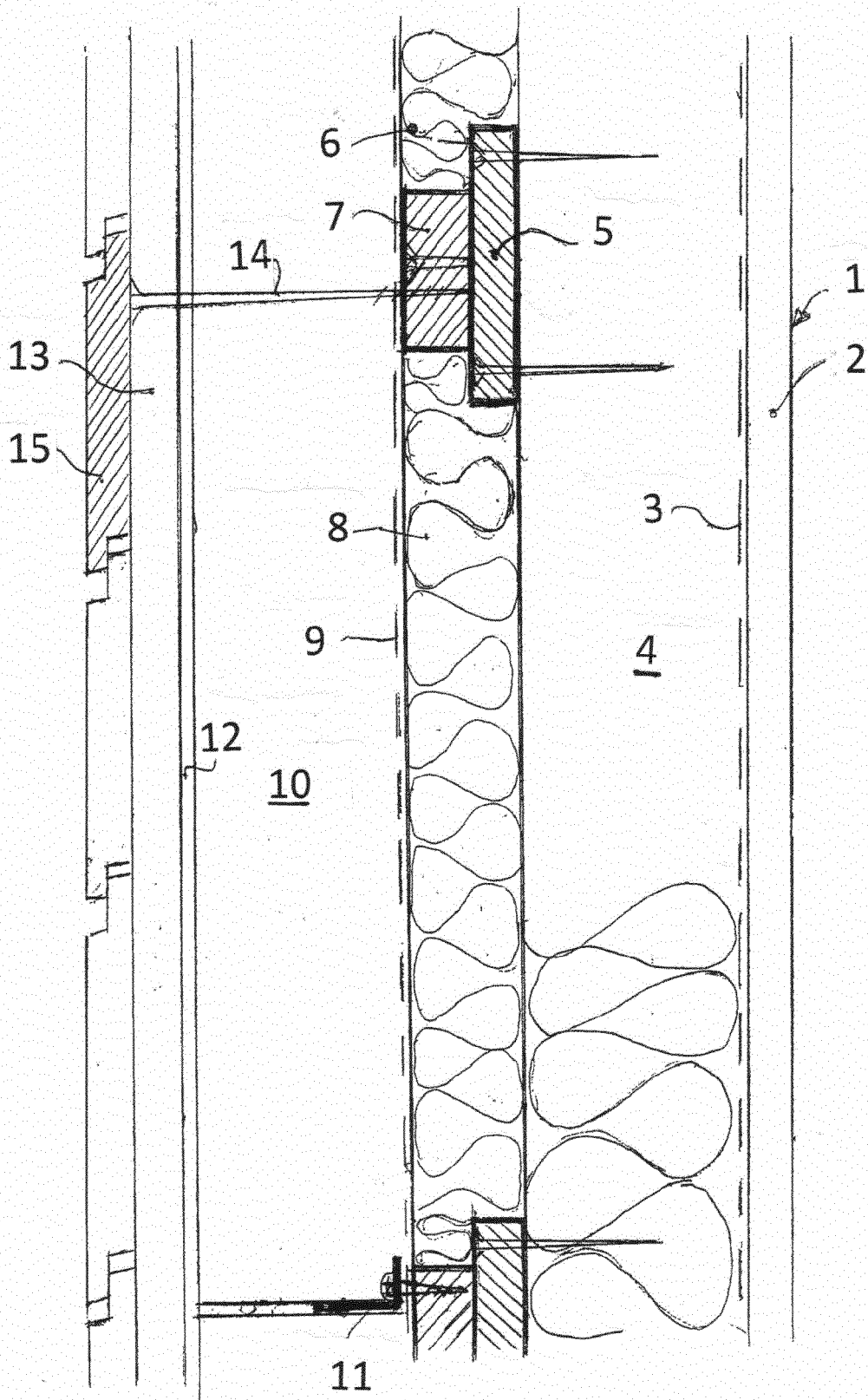
1. A method of post-insulation of an existing wall (1), which method comprises the following steps:

any cladding and windbreaker on the wall (1) are removed;  
 spacers (5) are attached to the wall (1) at pre-determined intervals, wherein the thickness of the spacers is sought adapted so that their outer surface (6) remains in the same vertical plane;  
 horizontal rails (7) are attached to the spacers (5) at mutual vertical distance;  
 the spaces formed between the rails (7) and the wall (1) are filled with a vapour open insulation (8); and  
 plates (10) of highly insulating material are placed against the rails (7) and being attached thereto, wherein the insulation properties of the wall (1), the vapour-open insulation (8) and the plates (10) are adapted to each other so that condensation against the plates of any water vapour present, is avoided on cold days.

2. The method according to claim 1, wherein the vapour-open insulation (8) is vented at the floor and ceiling and preferably above and below windows. 20
3. The method according to a previous claim, wherein the plates (10) on the outside are provided with laths (13) for the aeration and fastening of an outer cladding (15), wherein the laths are fastened with screws (14) protruding through the plates (10) and into the supporting elements (7). 25
4. The method according to a previous claim, wherein the plates (10) on the outside are provided with a gypsum board, preferably 9 mm thick. 30
5. The method according to a previous claim, wherein the insulation material of the plates is PIR. 35
6. The method according to a previous claim, wherein in the case of lack of diffusion prevention on the inside of the existing wall (1), a diffusion preventing material is mounted on the outside of the existing wall (1), after any insulation in the existing wall having been reduced or removed. 40
7. The method according to a previous claim, wherein windows are retracted a predetermined distance from the plates (10). 45

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EUROPEAN SEARCH REPORT

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			TECHNICAL FIELDS SEARCHED (IPC)
			E04B E04G E04F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		6 October 2023	Galanti, Flavio
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  
ON EUROPEAN PATENT APPLICATION NO.

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5 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 The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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**Non-patent literature cited in the description**

- Etterisolering av småhus” (Post-insulation of small houses). SINTEF Academic Press, 2017 [0002]