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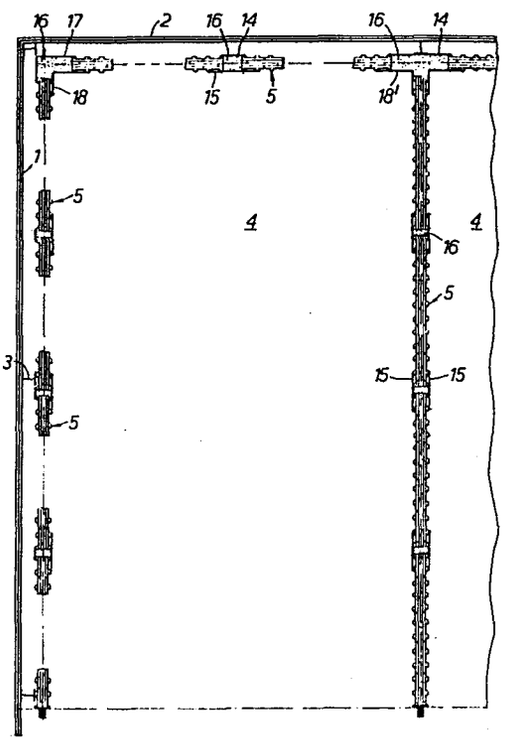
(54) Insulated space.

(57) An insulated space comprising upwardly extending walls built up from prefabricated wall elements consisting of two profiled metal plates between which insulating material is sandwiched and which are interconnected on their proximal side edges with the aid of coupling plates, whilst the space between the coupling plates and the proximal ends of the wall elements is filled with insulating material introduced into the space after the erection of the wall elements, whereby the profiled metal plates are glued to plate-shaped insulating material located between the profiled metal plates so that parts of the wave-shaped plates projecting beyond the insulating material are formed by the wave tops formed by flat plate parts and by adjoining parts of the profiled metal plates connecting the wave tops with the wave valleys engaging the insulating material, whilst the proximal ends of the wall elements are interconnected with the aid of the flat coupling plates engaging the wave tops and being fastened to the wave tops concerned.



Insulated space.

The invention relates to an insulated space comprising upwardly extending walls formed by prefabricated wall elements consisting of two profiled metal plates between which insulating material is sandwiched and which are coupled with one another on their proximal sides with the aid of coupling plates, whilst the space between the coupling plates and the proximal ends of the wall elements is filled with insulating material introduced into the space subsequent to the erection of the wall elements.

Such an insulating space is known from French Patent Specification 2,271,351. In this known construction profiled metal plates are used, which have grooves or extensions whose sectional area viewed in a direction normal to the direction of width of a wall element initially increases gradually and subsequently decreases gradually. The insulating material is sandwiched between the profiled metal plates by foam injection into the space between the plates. The proximal edges of the wall elements are fastened to one another with the aid of specifically profiled plates or rod-shaped fastening members, whilst fastening members located on both sides of the wall elements may be interconnected, in addition,by bolts or the like. This mode of fastening metal parts located on both sides of the wall elements by means of bolts or the like gives rise to undesirable heat leakage. Moreover the construction disclosed in said French Patent Specification requires fairly narrow tolerances and when using standard elements practically no variations can be made in the size of the space to be formed.

Apart from the fact that foam injection into the space between the profiled metal plates requires special precautions and the manufacture of such wall elements thus becomes expensive, a comparatively large amount of insulating material has to be used, since all projecting parts will be filled with insulating material so that across the width of the wall element the layer of insulating material will have a varying thickness, whilst the smallest thickness is determinative of the resultant insulation value.

The invention, therefore, has for its object to provide an

insulated space built up from simple wall elements by means of which the desired size of the insulated space can be obtained.

According to the invention this can be achieved in that the profiled metal plates are glued to the plate-shaped insulating material located between said profiled metal plates in a manner such that the parts of the wave-shaped plates projecting beyond the insulating material are formed by wave tops formed by flat plate parts and by adjoining parts of the profiled metal plates connecting the wave tops with the wave parts engaging the insulating material, whilst the proximal ends of the wall elements are interconnected with the aid of the flat coupling plates being in contact with the wave tops and being fixed to the wave tops concerned.

The wall elements can be manufactured in a simple manner since it is only necessary to glue the metal plates to the plate-shaped insulating material. It can be ensured in a simple manner that parts of the metal plates which have to be used for interconnection project out of the insulating material so that they are readily accessible. By using the wave tops for the interconnection there is a relatively large distance between the coupling plates interconnecting the wall elements, whilst in addition the space between the coupling plates will be filled out with insulating material, as a result of which satisfactory insulation is ensured also at the area of the junctions between neighbouring wall elements. Moreover, for the interconnection of the wall elements flat coupling plates can be employed so that it is simply possible to choose the width of the coupling plates in accordance with the standard widths of the wall elements and the desired length or width of the insulated space so that by using standard wall elements any desired size of the insulated space can be obtained in a simple manner. The space between the proximal ends of the wall elements and the coupling plates can be simply filled with effective insulating material when mineral wool flakes are blown into said space.

An upright wall of an insulated space can be erected in a simple manner in the proximity of a further wall, since at the joint between two neighbouring wall elements a coupling plate can engage the

inner side of the peaks of the wave-shaped plate and a second coupling plate can engage the outer side of the peaks of the other wave-shaped plate so that the wall elements can be interconnected whilst operating from one side. The coupling plates interconnecting the wall elements do not form troublesome extensions so that a flat structure of the upright walls of the insulated space can be obtained.

Corner joints between the wall elements can also be established in a simple manner by coupling wall elements being at an angle to one another with the aid of L-section coupling plates.

The construction of the insulated space can be further simplified by using roof elements built up in a similar manner as the wall elements.

Moreover, the connection of the insulated space with the ground surface can be effectively insulated in a simple manner by disposing the lower ends of the wall elements in gutters which are filled out with insulating material after the erection of the wall elements.

It should be noted that from French Patent Specification 2,115,583 there is known an insulated space built up from blocks of insulating material which are fastened to one another with the aid of tensile rods.

After the disposition of the insulating blocks in the desired manner to form the walls of the insulated space, these blocks are covered with metal plates which are coupled with the aid of tie rods extending across the insulating material with the tensile rods extending across the insulating blocks.

The erection of such an insulated space on a building site will take much time and in such a construction of an insulated space many heat leakages will occur due to the tensile rods and the tie rods.

The reference numerals in the Claims do not have a limitative function on the interpretation of the Claims.

The invention will be described more fully hereinafter with reference to the accompanying Figures.

Fig. 1 is a schematic, horizontal cross- sectional view of parts of insulated spaces in a building.

Fig. 2 is an enlarged, schematic sectional view of the building of Fig. 1 taken on the line II-II in Fig. 1,

Fig. 3 is a schematic, enlarged illustration of the connection of a roof element with an element forming a sidewall of an insulated space taken in the direction of the line III-III in Fig. 1.

Fig. 4 is an enlarged sectional view of the joint between two aligned wall elements.

Fig. 5 is an enlarged sectional view of a further embodiment of the joint between two aligned wall elements.

Fig. 6 is an enlarged sectional view of the joint between two orthogonal wall elements.

Fig. 7 is an enlarged, schematic sectional view of the joint between the ends of three wall elements converging at one point.

Fig. 8 shows schematically on an enlarged scale the joints between the ends of four wall elements adjoining one another at one point.

Fig. 1 shows schematically two orthogonal side-façades 1 and 2 and columns 3, which form part of a building including a plurality of insulated spaces 4. The walls of the insulated spaces are built up from prefabricated wall elements 5. From Fig. 1 it will furthermore be apparent that in the embodiment shown the insulated spaces are open on one side, which open side can be closed by a

displaceable door (not shown).

Each wall element 5 comprises two relatively spaced plates 6 of metal or a similar material, which have a more or less wave-shaped profile, in the embodiment shown, a so-called dam wall profile formed by parallel and relatively off-set plate portions interconnected by further plate portions extending obliquely between the first-mentioned plate portions.

Between the corrugated plate portions is provided insulating material formed in the embodiment shown by plates 7 of insulating material, preferably stone wool, arranged between the plates 6 and glued to one another and to the plates 6. Heat bridges between the plates 6 are thus avoided.

As will be particularly apparent from Fig. 2, angle-section irons 8 covering the entire width of the wall elements are fastened to the plates 6 at the lower ends of the wall elements 6 for supporting the wall elements. Fig. 2 furthermore shows that the lower ends of the wall elements are preferably disposed in gutters 10 provided in the floor 9. After the erection of the wall elements the cavities left in the gutters 10 can be filled out with insulating material. As a matter of course, the elements may also be disposed flat on the floor or the like.

Fig. 4 shows an example of a joint between two aligned wall elements 5. It will first be apparent from this Figure that the wall elements 5 are all arranged so that the ends of the insulating plates 7 arranged between the plates 6 are clamped tight between the most adjacent plate portions 11 forming the valleys of the wave-shaped plates 6, whereas the adjoining, outwardly inclined plate portions 12 extending away from one another and the adjoining plate portions 13 forming the peaks of the waves project out of the insulating material 7.

In the embodiment shown in Fig. 4 the plates 6 lying on one side of the aligned wall elements 5, in particular, the plate portions 13 forming the ends of said plates 6, are interconnected by a coupling plate 14 covering the entire height of the wall elements concerned and engaging the inner sides of the plate portions 13.

After fixation of said plate 14 to the plate portions 13, preferably by means of so-called pop nails, a further coupling plate 15 is secured to the plate portions 6 located on the side of the wall elements 5 remote from the coupling plate 14. From Fig. 4 it will be seen that the coupling plate 15 has a width such that it can be fastened to several wave peaks of the plates 6 concerned with the aid of, for example, pop nails.

When using the connection shown in Fig. 4 between aligned wall elements with the aid of the coupling plates 14 and 15, the wall elements 5 concerned need be accessible only from the side where the coupling plate 15 is fastened. Therefore, the wall elements 5 can be disposed closely to the wall 1 of the building, since, as is shown in Fig. 1, the space between the façade 1 of the building and the wall elements disposed near said façade need not be accessible for fastening the coupling plate 14.

When the wall elements are accessible from both sides, for example, in the case of a partition between two contiguous spaces 4, the wall elements may be interconnected on both sides with the aid of coupling plates 15 fastened to the outer sides of the wall elements concerned as is shown in Fig. 5.

After the coupling plates 14 and 15 or the coupling plates 15 are fastened, the space left between the proximal ends of the aligned wall elements 5 and the coupling plates concerned can be filled with insulating material, preferably by blowing mineral wool flakes 16 or similar insulating material into said space.

The width of the coupling plates 14 and 15 can be chosen in accordance with the desired dimensions of the insulated space and the dimensions of the wall elements 5 having a standard size. In this way, by using prefabricated standard elements the final length and width of the insulated spaces can be simply matched.

Fig. 6 shows an embodiment of a corner joint between the ends of two orthogonal wall elements 5.

From this Figure it will be apparent that for forming the outer side of the corner an L-section coupling plate 17 is used, which is in contact with the inner sides of plate portions 13 forming

the peaks of the wave-shaped plates 6. It will be obvious that, when this corner joint is accessible from the outer side, a coupling plate 17 can be used, which is in contact with the outer side of the plates 6, whilst said coupling plate may cover several wave peaks, to which it can be fastened.

For the inner side of the corner joint an L-section coupling plate 18 is used, which is in contact with the outer sides of the wave-shaped plates 6, in particular, with the peaks of the waves of the plate portions 13 of said plates 6. The coupling plates 17 and 18 can again be secured to the plates 6 by means of pop nails. After the coupling plates 17 and 18 are arranged in place, the space between these coupling plates is again filled with insulating material, preferably by injecting mineral wool flakes 16 or the like.

Fig. 7 shows a joint between two aligned wall elements and a wall element at right angles to said wall elements. From this Figure it is apparent that for this purpose a coupling plate 14' corresponding with the coupling plate 14 is used, though in the embodiment shown the coupling plate 14' has a larger width than the coupling plate 14 in the embodiment of Fig. 4. Furthermore, L-section coupling plates 18' corresponding with the coupling plates 18 of the embodiment of Fig. 6 are employed.

As a matter of course, also in this case, when the aligned wall elements 5 are accessible on the side remote from the wall element at right angles to said wall elements 5, a coupling plate may be used, which extends along the outer sides of the wave peaks of the plates 6 of the aligned wall elements.

Also in this case, after the arrangement of the coupling plates 14' and 18' the space left between these coupling plates and the interconnected ends of the wall elements 5 is again filled out with insulating material, preferably by injecting mineral wool flakes 16 into said space.

Fig. 8 shows a mode of fastening the ends of four wall elements adjoining one another at a corner. From the Figure it will be apparent that four L-section coupling plates 18" are used in the same manner as described above with reference to Fig. 6 for the

coupling plate 18.

As is schematically shown in Fig. 2, roof elements 19 may be used to form a ceiling of the insulated space, which elements are identical to or at least made in the same way as the wall elements 5. At the ends of the roof elements 19 angle-section irons 20 are arranged in the same manner as described above for the angle-section irons 8 fastened to the lower ends of the wall elements 5. The lower angle-section irons are bearing on a plate 21 consisting of insulating material, preferably mineral wool, which is disposed on the top ends of the wall elements 5. The plate 21 is locked between profile frames 22 of more or less Z-shaped section arranged at the top ends of the wall elements. In order to obtain a satisfactory seal a cement layer may be sandwiched between the top face of the insulating plate 21 and the angle-section irons 20 bearing thereon.

The space above the plate 21 between proximal ends of roof elements 19 bearing on the plate 21 is again filled out with insulating material, preferably mineral wool flakes 23, whilst said space is covered with the aid of a coupling plate 24, which is fastened to the upper angle-section irons 20 of the roof elements 19 concerned with the aid of pop nails or the like.

Whereas Fig. 2 shows the embodiment for a partition between two contiguous spaces, Fig. 3 shows the embodiment of a joint between a roof element 19 and a wall element 5 forming part of the outer wall of the space. Those parts which correspond with parts described above with reference to Fig. 2 are designated by the same reference numerals as in Fig. 2. Fig. 3 shows that a block 25 being in contact with the ends of the roof elements 19 is arranged on the insulating plate 21 covering the wall elements 5, said block consisting of insulating material, for example, mineral wool sheets glued to one another. If desired, said block may be surrounded by a screening hood (not shown), whilst any space left between the screening hood and the block 25 can be filled by injecting foam flakes.

From the foregoing it will be obvious that by using wall and roof elements of solid construction, that can be fabricated in a simple manner, an insulating space can be effectively and readily built up, whilst variations of the required dimensions of the spaces

can be readily matched by varying the width of the coupling plates used. Moreover, at the areas of the coupling points between the wall and/or roof elements an effective insulation can be simply and readily obtained.

The reference numerals in the claims do not have a limitative function on the interpretation of the Claims and solely serve for clarification.

CLAIMS

1. An insulated space (4) comprising upwardly extending walls built up from prefabricated wall elements (5) consisting of two profiled metal plates (6) between which insulating material (7) is sandwiched and which are interconnected on their proximal side edges with the aid of coupling plates (14, 15), whilst the space (16) between the coupling plates (14, 15) and the proximal ends of the wall elements (5) is filled with insulating material introduced into the space after the erection of the wall elements (5) characterized in that the profiled metal plates (6) are glued to plate-shaped insulating material (7) located between the profiled metal plates so that parts of the wave-shaped plates (6) projecting beyond the insulating material (7) are formed by the wave tops (13) formed by flat plate parts and by adjoining parts (12) of the profiled metal plates (6) connecting the wave tops (13) with the wave valleys engaging the insulating material, whilst the proximal ends of the wall elements (5) are interconnected with the aid of the flat coupling plates (14, 15) engaging the wave tops (13) and being fastened to the wave tops (13) concerned.

2. An insulated space as claimed in Claim 1 characterized in that the space between the coupling plates (14, 15) and the proximal ends of the wall elements (5) is filled with mineral wool flakes injected into said space.

3. An insulated space as claimed in Claim 1 or 2 characterized in that at the joint between two neighbouring wall elements (5) a coupling plate (14) is in contact with the inner side of the tops (13) of the profiled metal plate (6) and a second coupling plate (15) is in contact with the outer side of the tops (13) of the other profiled metal plate (6).

4. An insulated space as claimed in anyone of the preceding Claims characterized in that wall elements (5) being at an angle to one another are interconnected with the aid of L-section coupling plates (18', 18").

5. An insulated space as claimed in anyone of the preceding Claims characterized in that the roof elements of the space are formed

by elements (19) built up in a similar manner as the wall elements (5).

6. An insulated space as claimed in anyone of the preceding Claims characterized in that the lower ends of the wall elements (5) are arranged in gutters which are filled out with insulating material (10) subsequent to the erection of the wall elements (5).

7. A wall element apparently intended for building up an insulated space as claimed in anyone of the preceding Claims.

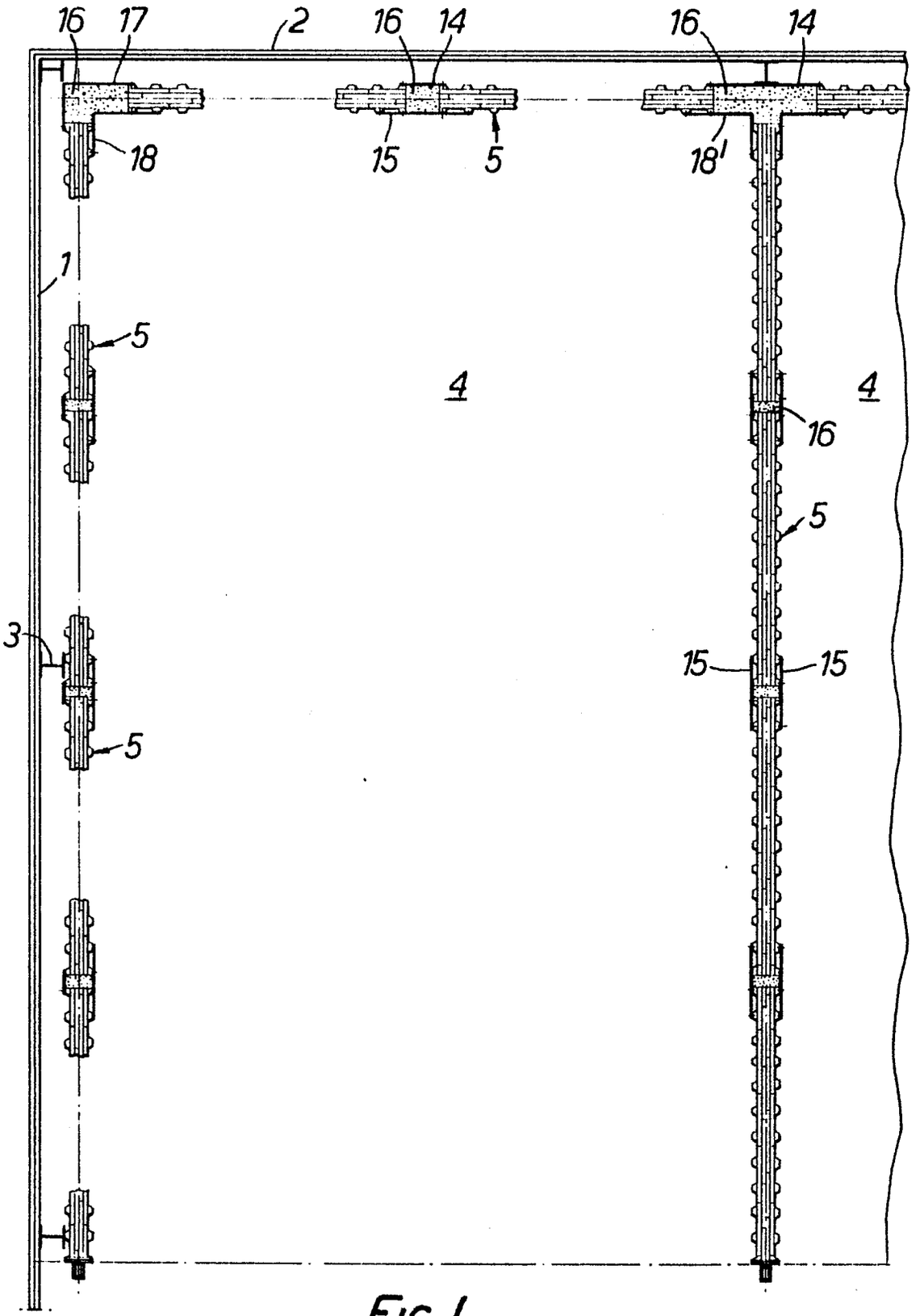


FIG. 1.

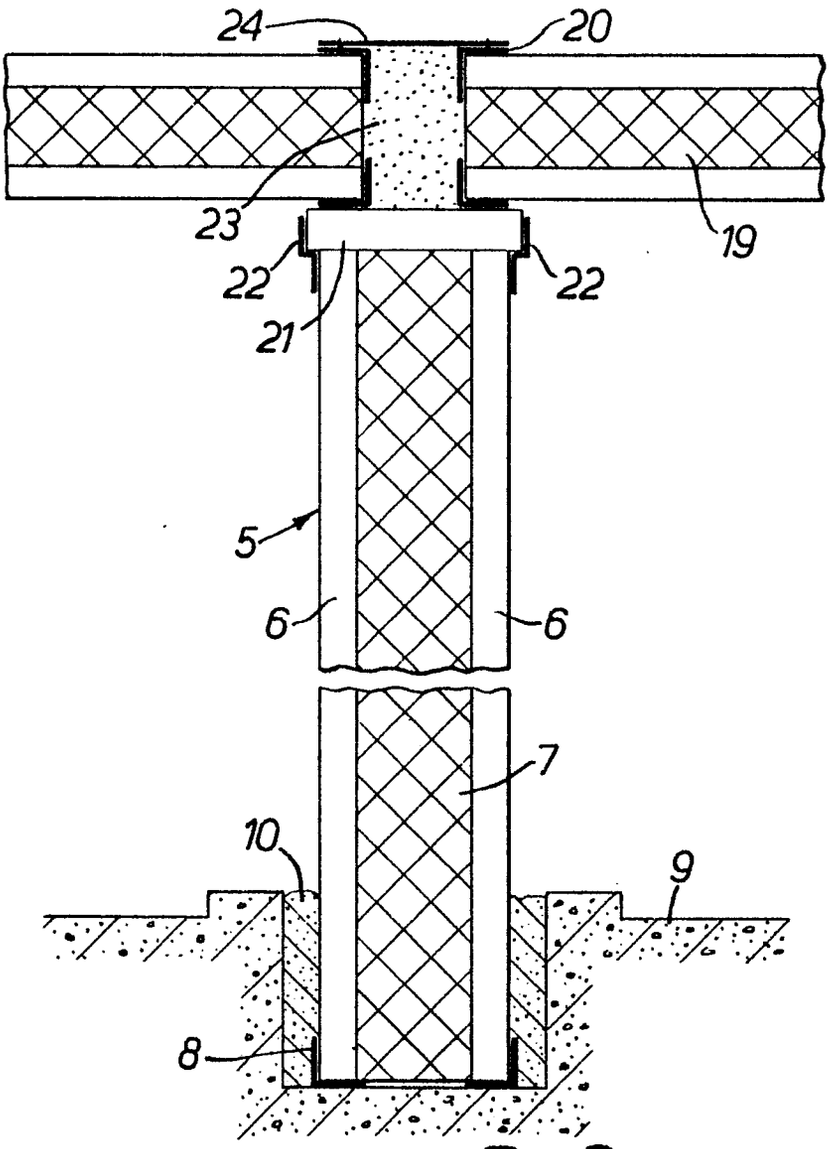


FIG. 2.

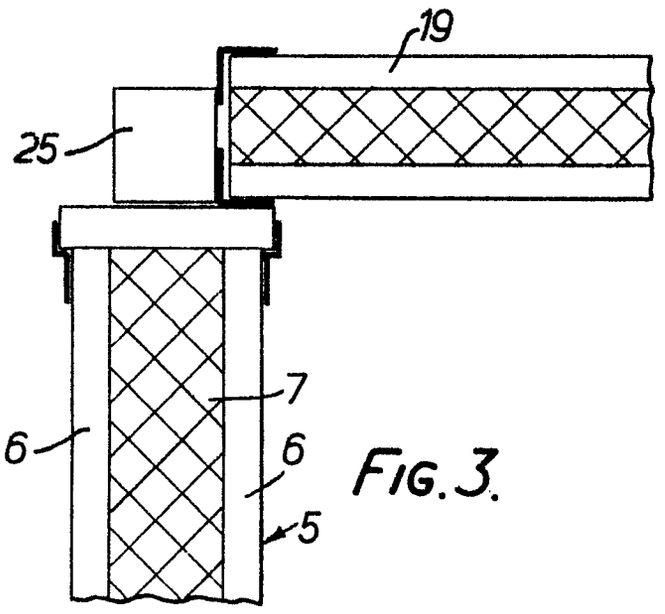


FIG. 3.

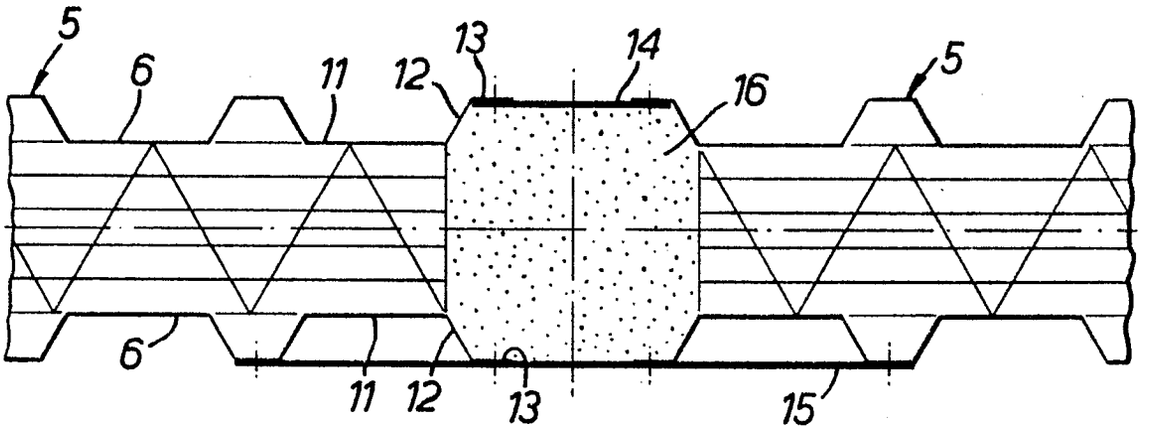


FIG.4.

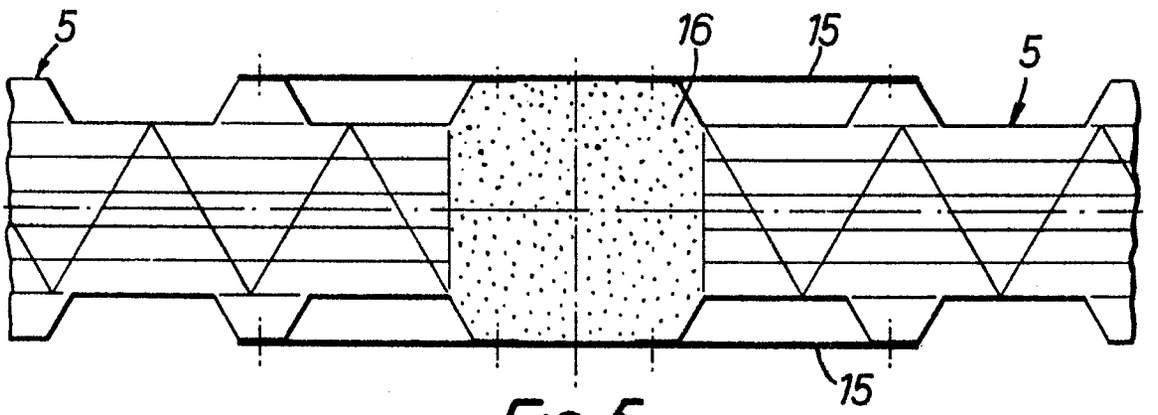


FIG.5.

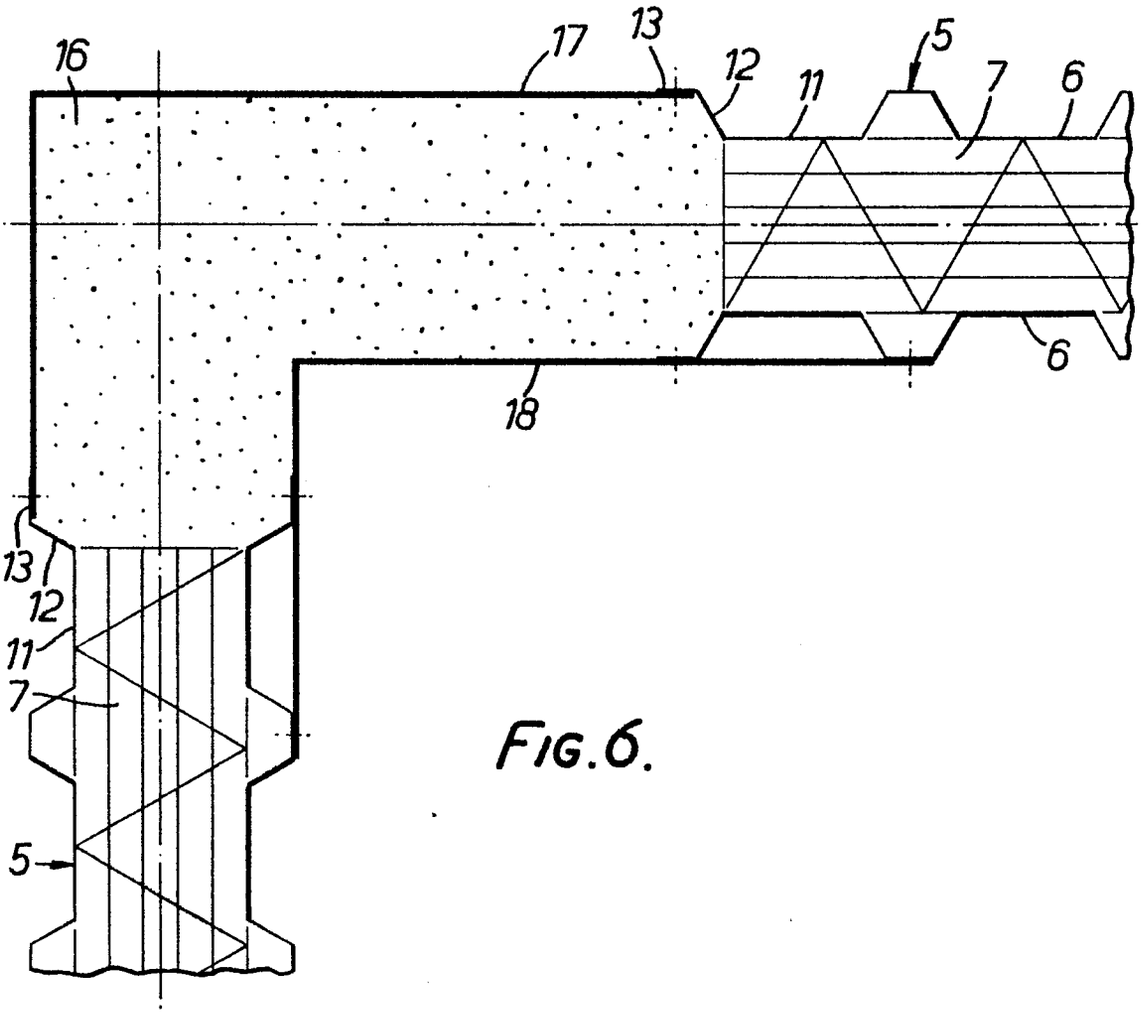


FIG.6.

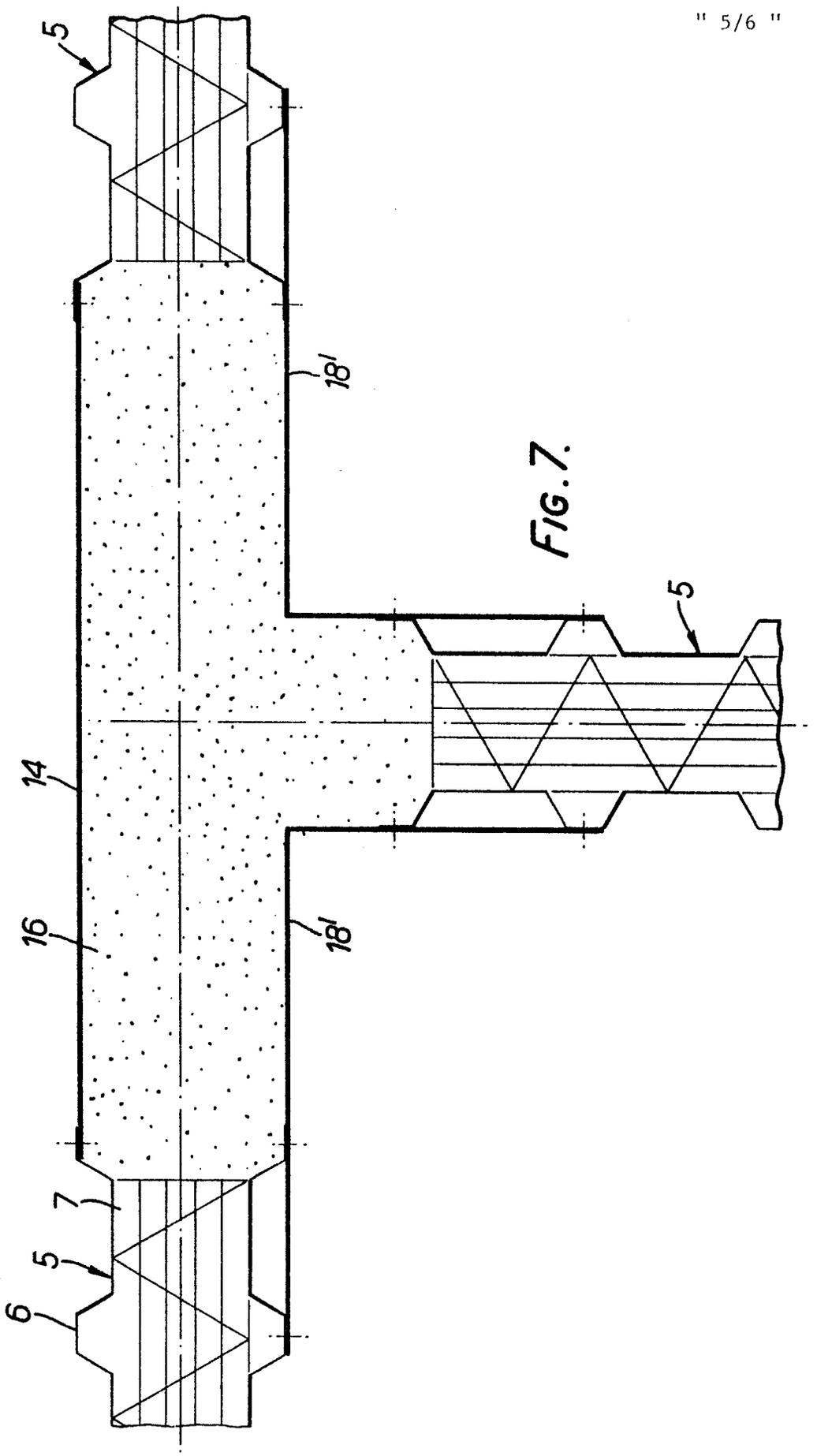


FIG. 7.

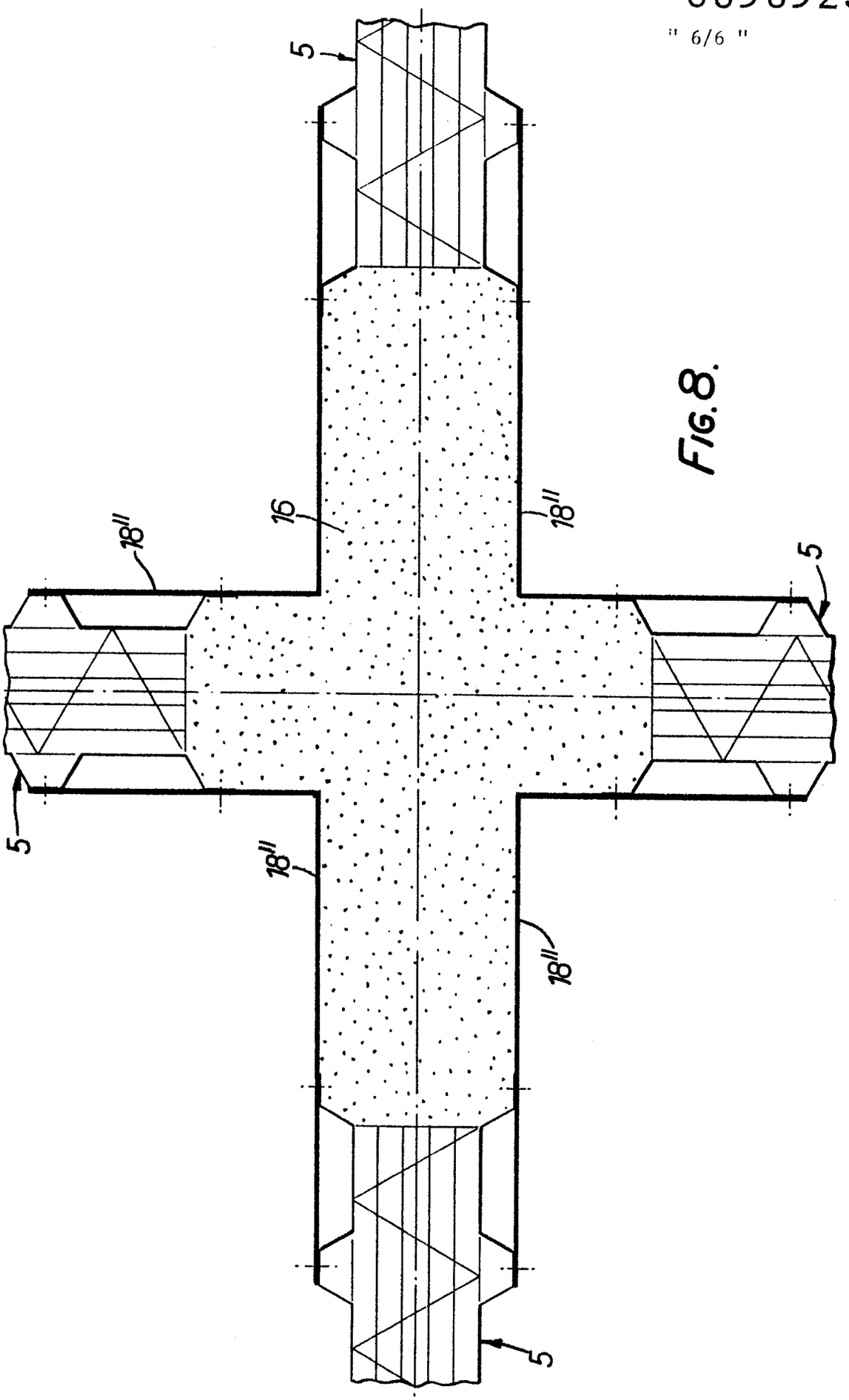


FIG.8.