109-82 CROSS REFERENCE SEARCH ROOM

March 29, 1955 J. J. VAN DRONKELAAR 2,704,983

ATOM-BOMBPROOF SHELTER

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Fig. 1.

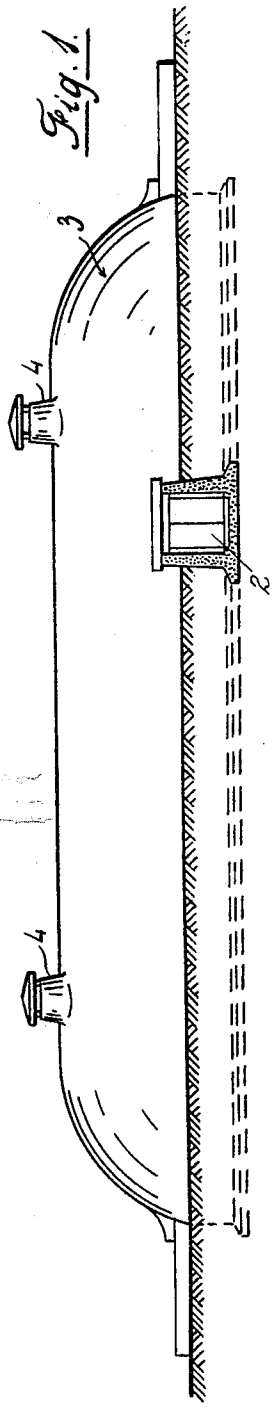
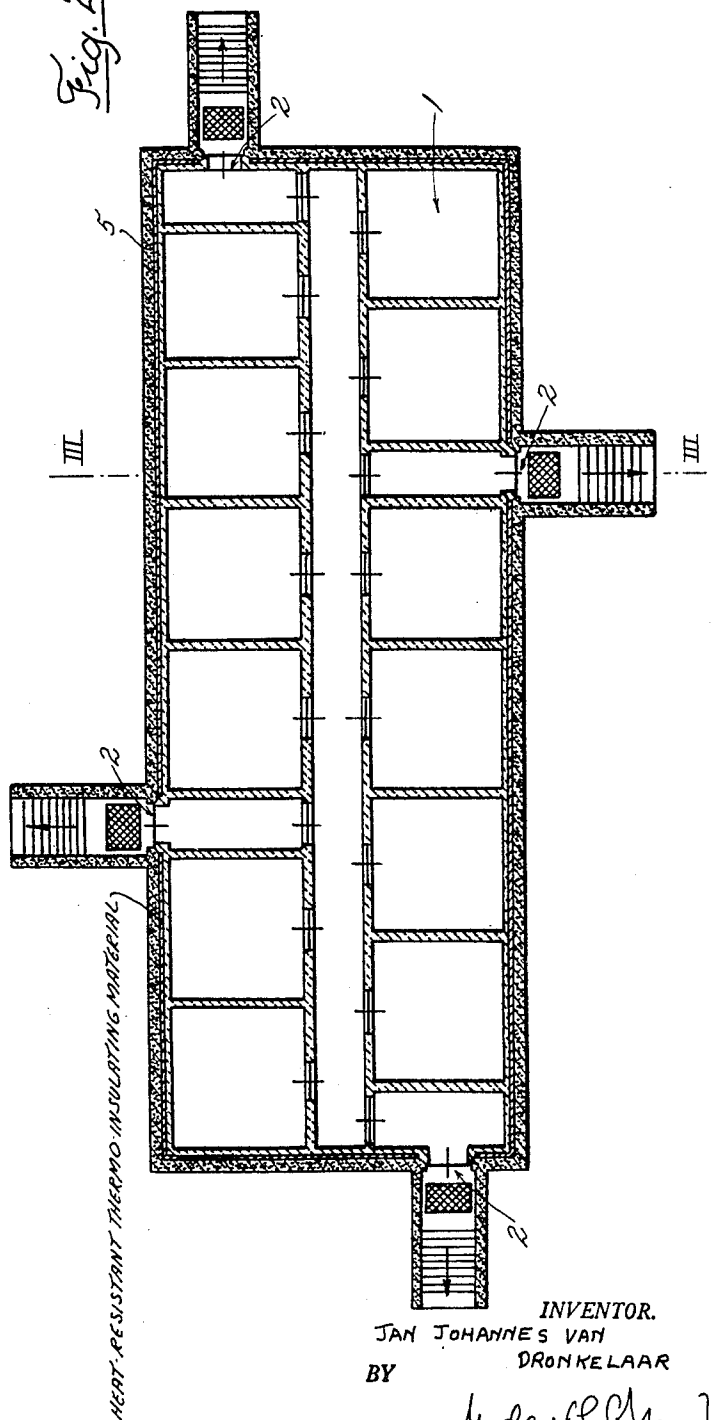
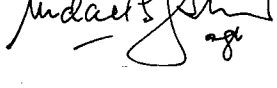


Fig. 2.



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Fig. 3

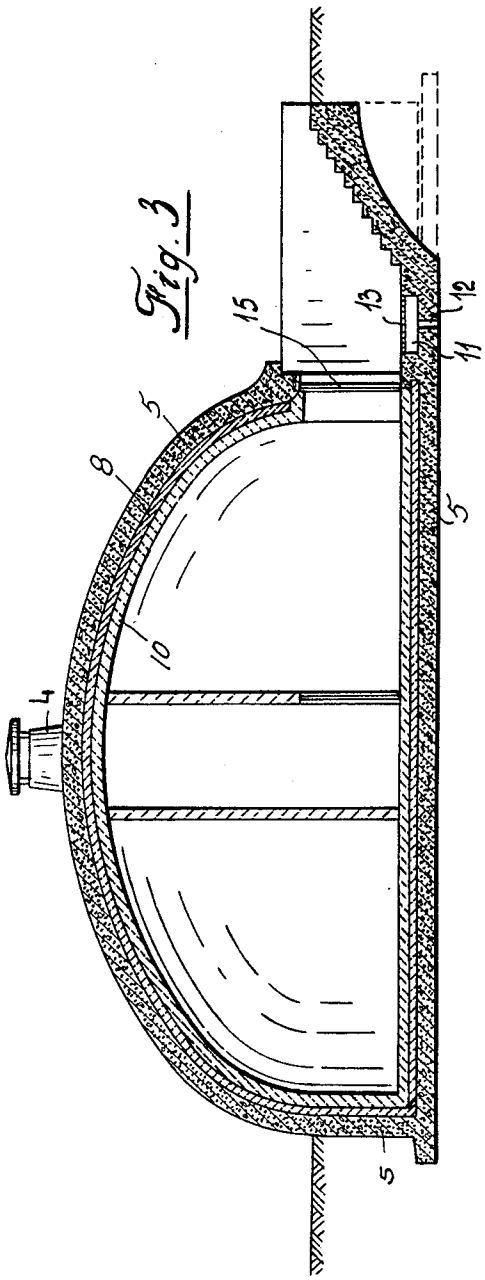
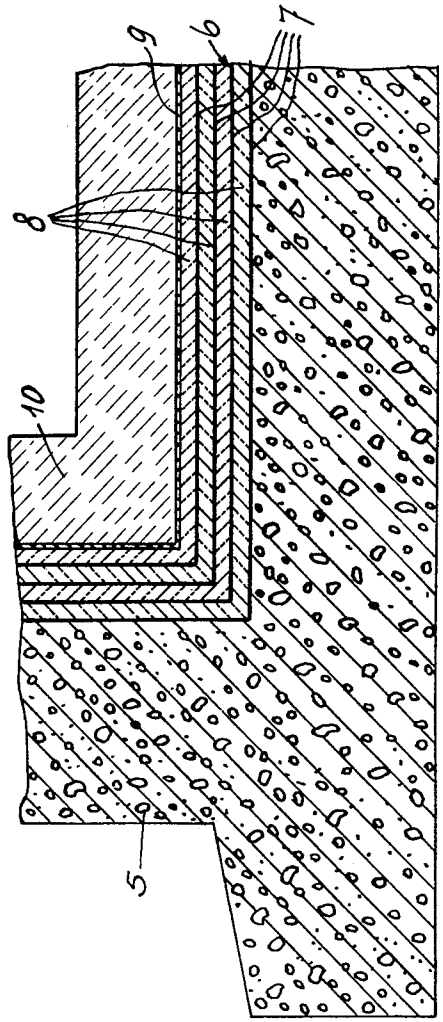


Fig. 4



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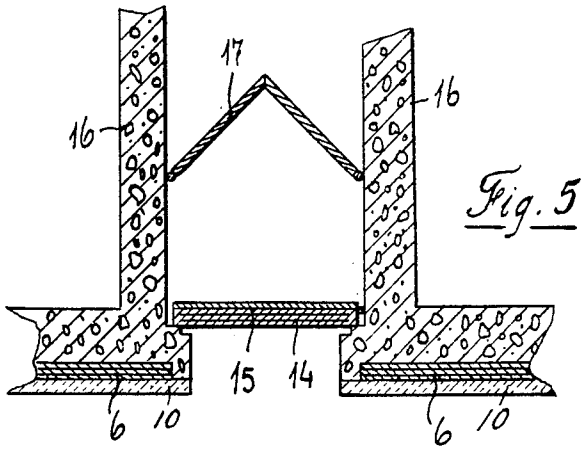


Fig. 5

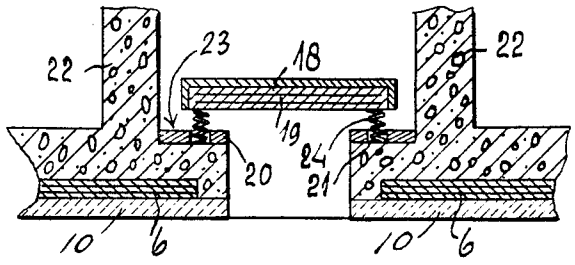


Fig. 6

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ATOM-BOMBPROOF SHELTER

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Application September 18, 1951, Serial No. 247,182

Claims priority, application Netherlands September 28, 1950

2 Claims. (Cl. 109—1)

The invention relates to an atom bombproof shelter, of which the shelter-room proper is surrounded by a screening mantle against the intense radio-activity attending the explosion of an atom bomb.

For this screening mantle one single lead-plate of sufficient weight was formerly suggested. As lead is, however, a metal of very little elasticity, and moreover has a low melting point, the very high temperatures and pressures attending an atom bomb-explosion may crack the lead, or melt it away locally, in case one single heavy lead-plate is used.

With such a shelter and weak spots in the screening mantle, i. e. the air-shafts and the entrances, moreover require special additional protection operated mechanically in case of an explosion.

The construction of the atom bomproof shelter of the invention is such, that the screening mantle is made of layers of lead alternating with layers of thermo-insulating material, which may also be more or less elastic.

Another feature of the invention is, that slag-wool may be used for the thermal insulation.

The invention further allows of one or more thermo-insulating layers of asbestos, by preference applied in the form of asbestos-board.

Another characteristic of the invention provides for devices fitted up at the air-shafts and entrance or entrances to absorb the high pressures on these parts of the screening mantle.

A description of the atom bombproof shelter according to the invention follows herewith; the attached drawings show:

Figure 1: a side view of the shelter, partly in section;

Figure 2: a horizontal sectional view of the shelter;

Figure 3: a cross-section along the line III—III of Figure 2;

Figure 4: a large-scale detail section of the screening mantle, the concrete layer and the brickwork;

Figure 5: a sectional view of the entrance-door;

Figure 6: a cross-section of an air-shaft.

The atom bombproof shelter **3** consists of the shelter room proper **1**, which may be divided into a number of compartments; four doors **2**, giving entry into the shelter. Air-shafts **4** ventilate the shelter.

As Figure 4 shows, the walls consist of an outer pressure resistant concrete layer **5** of sufficient weight, preferably of the following composition: 1 part cement; 1½ sand, and 2½ gravel. Then comes the mantle **6** screening against radio-activity, and next a layer **10** built of concrete or brickwork. This brickwork should preferably be made of limestone.

According to the invention the screening mantle **6** does not consist of heavy lead-plate, but is divided into several protective layers which are resistant against radio-active radiation, namely the lead-plates **7**, separated from one another by intermediate layers consisting of a heat-resistant thermo-insulating material **8**, which may be more or less elastic. For this material may be used slag-wool fitted between the plates **7** in the form of slag-wool blankets **8**. This slag-wool is an elastic and thermally perfect insulation for the plates, minimising the possibility of cracking at high pressures, and simultaneously reducing the chance of melting in so far as the inner layers are concerned. It is evident, that the total weight of the lead-plates is to be adapted to the expected radio-activity.

According to the invention it is possible to fit one or more layers **9** made of asbestos, to the wall of the shelter-room proper; for this purpose the so-called asbestos-board is particularly suited. The outer wall of the screening mantle too may be provided with similar additional asbestos layers.

The screening mantle described above covers the shelter completely, the only openings being the doors and air-shafts.

Figures 5 and 6 illustrate, only by way of example, how these "weak spots" may be reinforced.

In Figure 5 the side-walls of the passage are indicated by **16**; this passage is closed by a pivot-door consisting of an outer steel-plate **15** covered at the back with a screening plate **14** of the same, or practically the same, construction as the screening mantle **6**. At the explosion of an atom bomb such enormous pressure will be put on the flat door **15**, that this door may collapse. Therefore every passage is fitted with a second door **17** mounted in front of door **15**, of a very strong mechanical construction, and operating as a lock-gate opening out. It is possible to mount this lock-gate in a separate frame sunk in the concrete, so that enormous pressures put on the door are absorbed by this frame. If desired, the screening door **15** too may be constructed as a lock-gate.

Figure 6 shows the construction of an air-shaft. The vertical walls are indicated by **22**; **6** being the screening mantle which is interrupted for the ventilation opening. The top of the seat **23** is fitted with a thick steel cushion **20** provided with holes **21** for receiving compression-springs **24**. On these resilient means rests a cover means such as the strong steel-plate **18** covered on the inside with radiation-resistant plate **19** of the same or practically same construction as the screening mantle **6** and include layers of lead and of heat resistant materials.

The function of the cover means is clear. Normally the cover means will be pressed upward by the springs **21**, thus leaving the air-passage to the shelter free; while by a strong pressure the plate **18** is pressed down on its cushion **20**, so that the screening layer **19** is not directly exposed to high pressures and temperatures.

If necessary, the air-shafts may also be fitted with specially reinforced lock-gates as a further mechanical protection of the plates **18** and **19**. When the air-alarm has been sounded the said lock-gates can be operated electrically or pneumatically from the command-post.

Figure 3 shows further, that it is advisable to fit up a reservoir **11** in front of each door **15**, covered with a grating **13**, and providing with a waste-pipe **12** leading to a cesspool.

In the construction of the atom bombproof shelter here described certain specific forms and features of the invention may be changed or modified within the scope of the claims.

The number of alternating layers of lead-plate and thermal insulating material may be changed in accordance with the requirements.

Instead of slag-wool, fire resistant bricks or briquettes pressed of a powdered material produced by Foraminafera may be used for one or more layers, while the protection of doors and air-shafts may be construcetd otherwise.

The example here described and constructed is only partly sunk into the earth. This shelter-construction is very appropriate for the centre of towns, e. g. near hospitals, schools, etc.

When used as a main shelter, it should preferably be sunk deep into the earth with due observation of the characteristics here described.

I claim:

1. In a shelter for protection against nuclear bombs in combination, wall means including at least one outer layer consisting of a pressure resistant material; a plurality of protective layers consisting of a material resistant against passing of radio-active radiation; and intermediate layer means located between said protective layers, consisting of a resilient heat resistant material and having a low thermic conductivity whereby high pressure created by released nuclear energy is taken up by said pressure resistant outer layer, radio-active radiation is at least partly absorbed by said protective layers, and heat is prevented by said intermediate layer means from reach-

ing at least part of said protective layers so as to prevent melting and destruction of said protective layers by heat and pressure, said wall means being formed with at least one aperture for ventilating purposes; cover means arranged over said aperture and being larger than the same so as to project over said wall means; and resilient means abutting at one end thereof against said wall means and at the other end thereof against said cover means so as to resiliently support the latter.

2. A shelter according to claim 1 wherein said cover means are composed of at least one outer steel layer, at least one inner protective lead layer, and at least one intermediate layer consisting of a heat resistant material.

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