Dec. 20, 1938. K. W. MAUSER 2,140,709

CONSTRUCTIONAL ELEMENT

Filed Feb. 27, 1936

Fig. 1

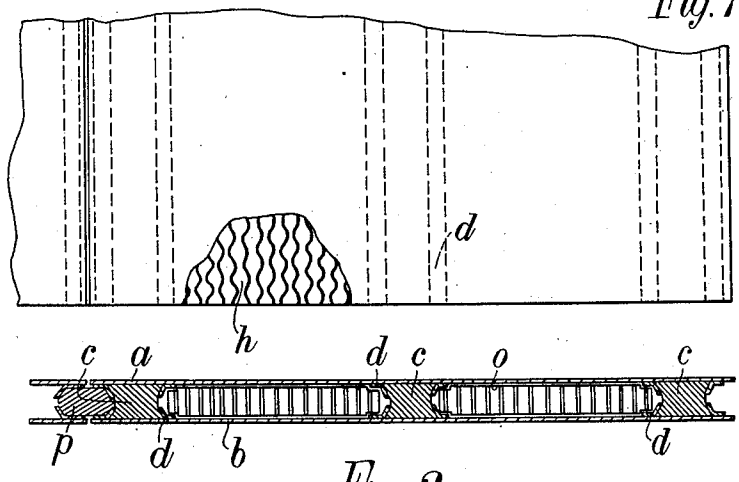


Fig. 2.

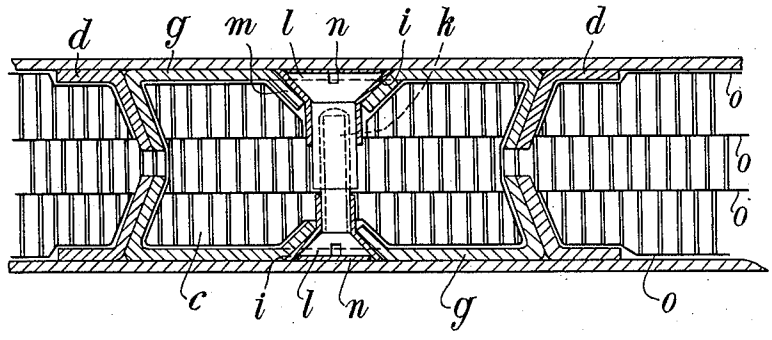


Fig. 3.

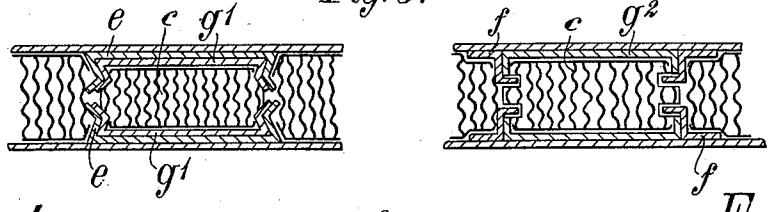


Fig. 4.

Fig. 5.

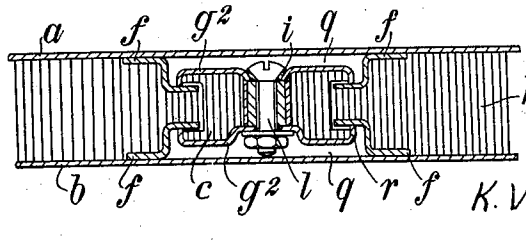


Fig. 6.

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CONSTRUCTIONAL ELEMENT

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In Germany February 28, 1935

4 Claims. (Cl. 189—34)

This invention relates to constructional elements of metal for enclosing rooms, ship's cabins and the like, which are formed from two or more metal plates held at distances apart and completely insulated from one another. Constructional elements are already known in which the metal plates are insulated from one another by solid insulating plates which are interposed. Such insulating plates are mostly made of cork, asbestos or the like, and have not sufficient strength to give the constructional element the desired stability. It was therefore found necessary to make the metal plates thicker. Apart from the high initial cost, this, in addition to the solid construction of the insulating layer, led to an increase of the weight, which is undesirable, especially in ship construction. Finally, metal webs have been used for connecting the metal plates of the constructional element which serve at the same time for re-inforcement and make it possible to diminish the thickness of the walls to a minimum. This results in a diminution of the weight, but the two outer metal plates are not thermally insulated from one another, because the connecting webs act as conductors of heat. Furthermore, the webs act as carriers of sound so that the insulating material enclosed in the hollow spaces becomes ineffective. The simultaneous connection of the webs with the metal plates leads to great difficulties, as, in order to avoid external projections, they can only be connected by spot welding. This may be effected by inserting a conducting core between the limbs of the web. Such manipulation, however, is very complicated and expensive. In order to obtain insulation of the outer metal plates of the element, insulating layers have been inserted between the limbs of the connecting webs and the metal plates. In that case spot welding cannot be used and counter-sunk screws have to be used for connecting, because, in view of the desired stability and portability of the element, the metal plates have to be securely connected together. The screw connection, however, is not only very complicated, but also it causes a great increase in the initial cost. There is no certainty of the insulation of the screws so that these, in spite of great care, act as conductors of heat. The thin insulating plates inserted between the web and the metal plates are not able to give sufficient insulation. It is to be considered that, especially in ship construction, the metal partitions must act as fireproof walls, so that when great heat is applied on one side of the constructional element it does not have any result at the other side.

These disadvantages are avoided by the invention by which a constructional element is produced which satisfies all requirements as to stability and insulation for sound and heat. According to the invention, for spacing and connecting the metal plates, rails of solid insulating material are used which are held in dove-tail or step-like guides secured at the inner sides of the metal plates, for example by spot-welding. These rails can easily be slid in or out so that the assembly of the metal plates to form a constructional element in a simple manner is facilitated. It is advisable to make the rails from two metal strips corresponding in shape to the guides, which encloses the solid insulating core to such an extent that a sufficient distance remains between the metal strips to ensure complete insulation. The securing of the dove-tail or step-like guides to the metal plates by spot-welding can be effected without trouble in a simple and cheap manner.

Furthermore, according to the invention it is proposed to use as insulating material corrugated card made from asbestos or the like. When suitably used this has a high strength and is suitable for sufficiently protecting the metal plates against being forced in. The constructional elements are sufficiently strong, even when the walls are thin, and the stability can be increased by providing a suitable number of connecting rails. The corrugated insulating card has the advantage over the solid insulating layers of being considerably less in weight. The assembly is effected according to the course of the corrugations in such a manner that separate plates or strips are formed which are covered by plane card layers. The sound and heat insulation can be increased to a great extent by providing a suitable number of card layers, that is by dividing the corrugated material into layers.

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

Fig. 1 is an elevation and Fig. 2 a cross-section of a constructional element.

Fig. 3 is a cross-section of a part of an element on a larger scale.

Figs. 4, 5 and 6 are cross-sectional views of modified constructions.

Figure 2 shows a cross-section through a constructional element consisting of two metal plates *a* and *b*. For connecting them together the plates have on the inside dove-tail shaped guides *d* in between which the connecting rails *c* of solid insulating material are slidably guided so as to be easily removable if and when required. At

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the places where the elements are joined together the guides *d* serve also as abutments for the insulating insertions *p* used for connecting the two elements together. The hollow space remaining between the metal plates *a*, *b* is filled with corrugated card made of asbestos or the like.

Figure 1 shows a partial elevation of the element with a part cut away to show the lamination of the corrugated card *h*. Figure 3 shows a view on a larger scale of one form of connection of the metal plates *a*, *b*. The solid insulating core *c* is partly enclosed by two metal strips *g* which slide on the plates *a*, *b* and in the guides *d*. The sliding in and out of the rails *c* is greatly facilitated by the arrangement of the metal strips *g*. An essential feature, however, is the increased stability of the connection and therefore of the constructional element obtained thereby. As is clear from Figure 3 the connection of the two metal strips *g* can be secured by means of a screw and threaded sleeve *k*, the heads *l* of which fit in depressions *m* of the metal plates *a*, *b* which are fitted in insulating sleeves *i*. The screw heads are insulated from the metal plates *a*, *b* by means of small insulating plates *n* applied so as to adhere, which may be arranged to spring back with respect to the outer edges of the rail, so as not to form an obstruction to the sliding in of the rail. Such screw connections for the metal strips *g* at two places are sufficient for ordinary rails of a length of 2–3 metres.

Figure 4 shows another method of connecting the metal plates *a*, *b* in which the metal strips g^1 and the guides *e* have a double dove-tail engagement which causes the rails to be guided with greater certainty. The guiding strips g^1 in this case are made in pairs from a metal strip and are thus connected with the metal plates *a* or *b*.

Figure 5 illustrates a constructional form of the connection of the metal plates *a*, *b*, in which the metal strips g^2 are simply bent back at right angles and engage in step-like guides *f* secured to the metal plates.

In the modified form of the invention shown in Figure 6, the distancing bars are so constructed that a space is left between the holders and the metal plates. When they are slid in, the abutting edges of the holders slide on the metal plate guides, so that the frictional resistance is reduced to a minimum. This construction has a further advantage, in that the insulation of the outer metal plates with respect to one another is considerably improved, more particularly by the air cushion in the intermediate space *q*.

The metal plates *a* and *b* are provided on the inner side with guides *f*. Between the plates is the compact filling of insulating material *h*. The distancing bar consists of the compact insulating mass *c* which is enclosed on two sides by the independent holders g^2. The latter are connected together by the screws *l*. The insulation of the screws *l* with respect to the holders g^2 is effected by means of insulating discs *i*. The holders g^2 have at the ends bent-over parts *r* so that they only bear against the guides *f* with the thickness of the material. Air spaces *q* are left between the metal plates *a* and *b* and the distancing bars g^2, *c*.

It is of advantage for the stability of the constructional element for the rails *c* to be made to pass right through, so that a smooth bearing surface for the plates *a*, *b* is ensured. Instead of the rails it would be possible also to use separate short connecting pieces in order to obtain a better insertion of the insulating plates *h* of corrugated card, or to obtain a further diminution of weight and saving of material. The method of using the corrugated insulating material is shown in the various figures. Thus the cut away part in Figures 1, 2 and 3 show the arrangement of the corrugations transverse to the metal plates *a*, *b* in which position the corrugated material offers the greatest resistance to lateral pressure on the metal plates. This arrangement will therefore principally be used for filling of the connecting rails *c*. Figures 4 and 5 show the arrangement of the corrugations along the connecting rails, the layers running transverse to the metal plates *a*, *b*, in Figure 4, and parallel thereto in Fig. 5. The layers of corrugated material are held together in separate plates or strips by means of the outer plane covers *o*. For increasing the sound and heat insulation it is possible to insert several plane insulating layers *o* as shown in Fig. 2. The effectiveness of such insulation against heat has been tested experimentally in the construction of the element according to the invention. Thus, for example, when the metal plate *a* was exposed to a temperature of about 500° C., even after a long time a temperature of only 32° C. was measured at the plate *b*.

What I claim is:—

1. A sound and heat insulating constructional element consisting of a plurality of spaced metal plates, rails for connecting and spacing the metal plates, each consisting of corrugated asbestos material and two sheet metal strips partly enclosing the corrugated asbestos material, and guides, shaped to fit the sheet metal strips, between which the rails can slide, arranged on the inner sides of the metal plates.

2. A sound and heat insulating constructional element consisting of a plurality of spaced metal plates, rails for connecting and spacing the metal plates, each consisting of compact insulating material and two sheet metal strips partly enclosing the insulating material, a screw and a threaded sleeve for each rail for securing the metal strips together, the metal strips having depressions for receiving the heads of the screw and sleeve, and insulating linings for the depressions and insulating plates for covering the heads of the screw and sleeve, and guides, shaped to fit the sheet metal strips, between which the rails can slide, arranged on the inner sides of the metal plates.

3. A sound and heat insulating constructional element consisting of a plurality of spaced metal plates, rails of corrugated asbestos material for connecting and spacing the metal plates, and guides shaped to fit the rails, between which the rails can slide, arranged on the inner sides of the metal plates.

4. A constructional element as claimed in claim 1, in which the corrugated asbestos material is laminated.

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