April 28, 1931. J. MOLL 1,802,522

CORRUGATED CARDBOARD

Filed Dec. 20, 1927

Fig. 1

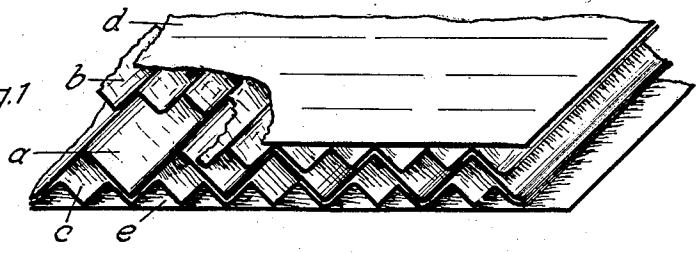


Fig. 2.

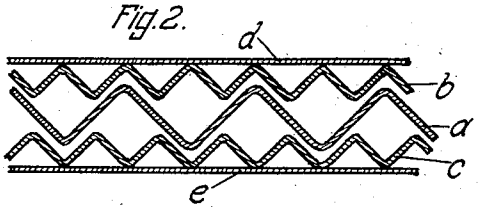


Fig. 3.

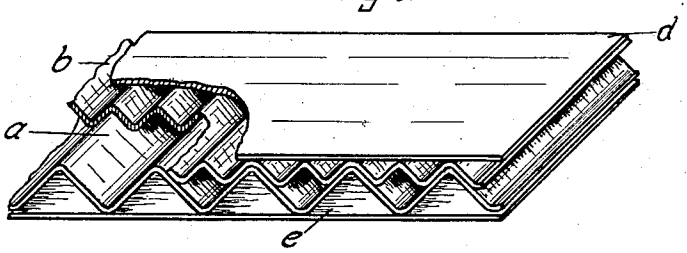


Fig. 4.

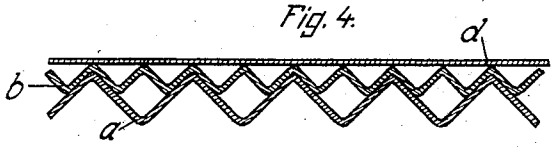


Fig. 5.

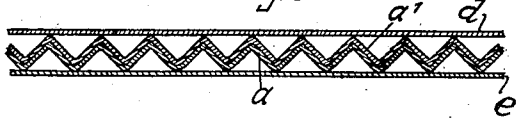


Fig. 6.

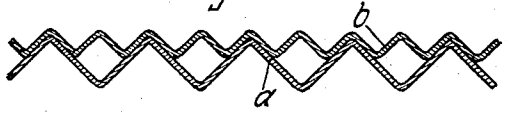
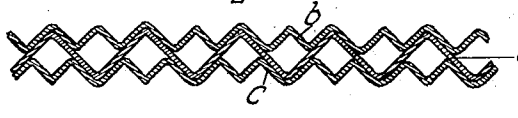


Fig. 7.



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UNITED STATES PATENT OFFICE

JACOB MOLL, OF LUCKA, SACHSEN-ANHALT, GERMANY

CORRUGATED CARDBOARD

Application filed December 20, 1927, Serial No. 241,372, and in Germany May 21, 1926.

My invention relates to corrugated cardboard. It is an object of my invention to provide a material of this type which possesses excellent properties as to strength, resiliency, low weight, heat insulation and sound deadening, and may serve as a substitute for wood in the manufacture of boxes or furniture, as a building element and for various other purposes for which ordinary corrugated cardboard cannot be used.

To this end the cardboard according to this invention is formed of at least one principal or central layer in combination with at least one subsidiary layer, the corrugations of which are of smaller height and smaller pitch than those of the principal or central layer, or of at least two layers of identical section.

In a preferred embodiment of my invention I combine a central principal layer with two outer layers, the central layer and the two outer layers having straightsided corrugations, the height of the corrugations of the outer layers being about one half that of the central layer and the pitch of the corrugations in the outer layers being so determined with respect to that of the central layer that each depression of the central layer corresponds to two elevations of the outer layers.

In this manner I obtain a system of air spaces in the cardboard which are bordered by braces of triangular cross-section, and by the interaction of these braces the cardboard is reinforced while preserving its resiliency, and its resistance to shocks and blows is considerable. The air included in the several spaces imparts to the cardboard heat-insulating and sound-deadening properties which render it particularly suitable for use as a material or lining for heat- or cold-insulating containers, telephone cells, doors of conference rooms, and the like. The cardboard is also very suitable for shipping fragile objects, such as glass, tubes and the like, which are inserted in its air spaces so as to be protected against mutual contact.

This cardboard may further serve as substitute for wood in the manufacture of boxes, furniture, telephone cells, etc., exactly like wood, and also as a building element for linings, partitions, floors, and the like.

In the drawings affixed to this specification and forming part thereof several types of cardboard embodying my invention are illustrated diagrammatically by way of example.

In the drawings:

Fig. 1 is a perspective illustration of cardboard having a central layer and two outer layers,

Fig. 2 is a section of this cardboard at right angles to its corrugations,

Fig. 3 is a perspective illustration of cardboard having a single central and a single outer layer, partly broken away, with covering layers on both sides,

Fig. 4 is a section of the cardboard illustrated in Fig. 3, with one of the covering layers omitted,

Fig. 5 is a section of cardboard comprising two principal layers of identical section without outer layers, but with cover layers,

Fig. 6 is a section of cardboard similar to that illustrated in Figs. 3 and 4, but without any covering layer,

Fig. 7 is a section showing cardboard similar to that in Figs. 1 and 2, but without any covering layers.

Referring now to the drawings and first to Figs. 1 and 2, *a* is the principal of central layer of the cardboard, having straight-sided corrugations with an apex angle of about 90 degrees slightly rounded at the edges, *b* and *c* are outer layers, and *d* and *e* are covering layers secured to the outer layers on the outside. The pitch and the height of the corrugations in the outer layers *b*, *c*, which otherwise are similar to those in the central layer, that is, straight-sided and with an apex angle of about 90 degrees, are about one half that of the corrugations in the central layer *a*, so that, as appears from Fig. 2, one corrugation of the central layer bridges two corrugations of each outer layer. The sides of the corrugations in the central and outer layers extend in parallel, which facilitates pasting. In Fig. 2 the three layers have been shown some distance apart for the sake of clearness, but in fact they are in contact and the relative arrangement of the corrugation affords very efficient distribution of the pasting faces.

In each corrugation of the principal or central layer *a* an air space of substantially rectangular cross-section, and two air spaces of triangular cross-section are formed. As the sides of the corrugations are not in contact throughout, the cardboard notwithstanding its resistance to shocks and blows, is still comparatively resilient.

In the cardboard shown in Fig. 3 the lower layer *c* illustrated in Figs. 1 and 2 is dispensed with and the lower covering layer *e* is attached to the principal layer *a*, but otherwise the arrangement is similar to that illustrated in Figs. 1 and 2. This section is particularly suitable where only one of the faces of the board should be particularly stiff and strong. It will appear that the pitch of the apex lines below the upper covering layer *d* is twice that of the pitch along the lower layer *e* and therefore this cardboard is much stronger on the side where the smaller corrugations are situated. This section is particularly suitable for small boxes in which the stiff side *d* is the outside and the more yielding side *e* is the inside.

Shipping of the cardboard is facilitated by rolling it into cylinders and in this case one of the cover layers is dispensed with, as the layer *e* in Fig. 4, so that the cardboard is not too stiff for rolling up.

Fig. 5 illustrates a particularly rigid cardboard having two principal layers *a* and *a'* combined and provided with covering layers *d*, *e* on either side.

Fig. 6 is a section similar to that in Fig. 4, comprising a principal layer *a* and an outer layer *b*, but no covering layers.

Fig. 7 shows the section combined with a second outer layer *c* as in Fig. 1, but still without covering layers. The sections Figs. 6 and 7 are particularly suitable where heat insulation and sound deadening are important factors.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described for obvious modifications will occur to a person skilled in the art.

I claim:—

1. Combination paper board comprising a parallel layer on either side, and a plurality of kinked strips inserted between said layers, said strips being connected with one of said layers by their kinked edges and with each other by their flanks.

2. Combination paper board comprising a parallel layer on either side, a kinked strip secured to one of said layers by its kinked edges, and another kinked strip secured to the other layer by its kinked edges and connected with said first-mentioned layer by its flanks.

3. Combination paper board comprising a parallel layer on either side, a kinked strip secured to one of said layers by its kinked edges, and another kinked strip having twice the pitch of said first-mentioned strip, secured to the other layer by its kinked edges and connected with said first-mentioned layer by its flanks.

4. Combination paper board comprising a parallel layer on either side, a kinked strip secured to each layer by its kinked edges, and a third kinked strip inserted between said first-mentioned strips and secured to their flanks by its flanks.

5. Combination paper board comprising a parallel layer on either side, a kinked strip secured to each layer by its kinked edges, and a third kinked strip having twice the pitch of said layers, inserted between said first-mentioned strips and secured to their flanks by its flanks.

6. Combination paper board comprising a plurality of kinked strips connected with each other at their flanks and having their kinked edges projecting on one side of said paper board.

7. Combination paper board comprising a plurality of kinked strips connected with each other at their flanks and having their kinked edges projecting on either side of said paper board.

8. Combination paper board comprising a layer on one side, and a plurality of kinked strips connected with said layer by their kinked edges at one side, and having their kinked edges projecting freely on the opposite side.

In testimony whereof I affix my signature.

JACOB MOLL.