June 25, 1968 E. J. SPECA ET AL. 3,389,451

METHOD OF MAKING AN INTERLOCKING STRIP STRUCTURE

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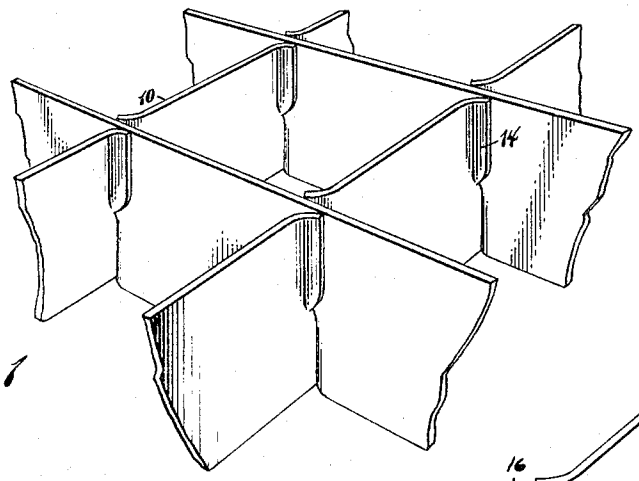

Fig. 1

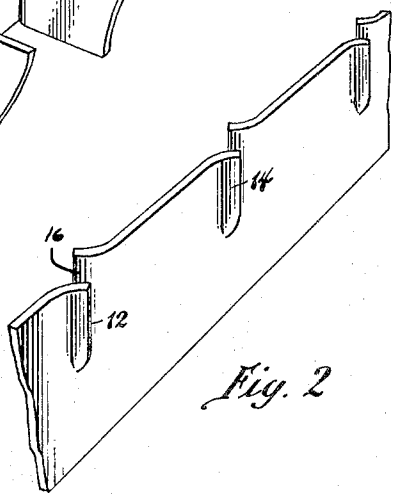

Fig. 2

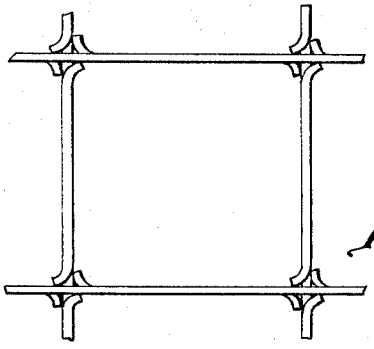

Fig. 3

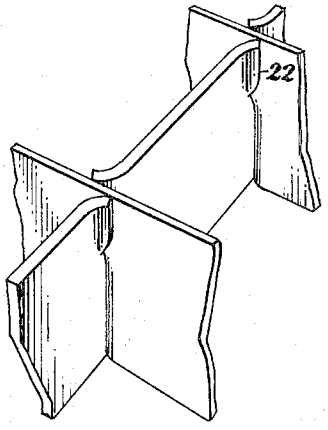

Fig. 4

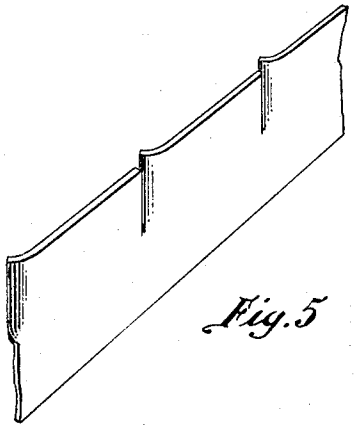

Fig. 5

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METHOD OF MAKING AN INTERLOCKING STRIP STRUCTURE

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7 Claims. (Cl. 29—160)

ABSTRACT OF THE DISCLOSURE

An effective method of making an internally braced wall of the "honeycomb" type in which the internal structure thereof is readily formed and provides great strength.

This invention relates to a method of making an interlocking strip type structure that is relatively strong, easily constructed and economically produced. More particularly, it relates to a method of making a "honeycomb" or "egg-crating" type structure that is produced from an arrangement of interlocking material strips requiring a minimum of preparation and assembly.

The strength requirements of modern aircraft have motivated the development of structures embodying the invention since such structures have a very high strength to weight ratio deemed especially desirable for aircraft construction.

Frequently it is desirable that such "honeycomb" or "egg-crating" type of structure be made more readily available for other applications such as flow dividers, floor grating or wherever there is need for a structural member having a high strength to weight ratio. However, the cost of producing such structure has remained excessive and at present they are used but infrequently outside the aircraft industry. It is therefore the principal object of this invention to provide a core for a honeycomb type structure that is strong and durable but which may be economically and easily produced.

For a better understanding of the invention reference may be had to the following description in conjunction with the drawing in which:

FIGURE 1 is a perspective view of a partial assembly embodying a series of interlocking transverse and longitudinal strips,

FIGURE 2 is a partial perspective view of a single strip formed in accordance with the invention,

FIGURE 3 is a plan view of a structure assembled according to the arrangement of FIGURE 1,

FIGURE 4 is a modified form of the invention, and

FIGURE 5 shows a further modified element of the invention noted for its simplicity of construction.

In the drawings a series of material strips **10** having a substantially constant width are formed to a length required for the longitudinal and transverse members of a porous grid to be used in the high strength to weight structure of the invention.

The strips are periodically slit laterally as at **12** on a conventional punch press or by running the strips through a set of properly designed forming rolls. The punch press or forming rolls may be designed to simultaneously impart of the material adjoining one or both sides of the slit an offset portion **14** which serves when assembled as a stiffener, while the space between offset portions comprises a gap **16** necessary in assembly for the intermeshing of confronting strips.

Greatest ease of assembly will obtain when the gaps **16** are sized somewhat greater than the thickness of the superimposed strips in order that the gaps may freely receive the web of the mating strip. Similarly, greatest rigidity and stability will obtain when the gaps **16** are somewhat

smaller than the thickness of said strips and the material adjoining the gaps must be sprung slightly to obtain admittance for the mating strip. Thus an optimum arrangement for mating strips slit in accordance with the invention would obtain when the gaps of cooperating strips are formed to provide a snug fit, neither too loose so as to preclude lateral support nor too tight so as to make for difficult assembly.

For optimum strength and rigidity in compression the longitudinal strips **10** are preferably formed with a laterally offset portion **14** at both sides of each slit **12**, while the transverse strips are similar but formed to the opposite hand in the manner shown by FIGURE 2.

For other applications where maximum resistance against lateral distortion or bending in a particular plane is desired, such as for use in a floor grating which supports its entire load on its upper surface, the strips may be slit laterally to provide greatest strength in that portion of each strip subjected to maximum stress. Such strips may additionally be formed from different gages of material having longitudinal and transverse strips variously slit in the manner shown by FIGURE 4 of the drawing.

A further variation illustrated in FIGURE 5 involves the bending of the metal comprising strip **10** only at one side of each slit **12** to provide the gap therein. In providing this arrangement longitudinal and transverse strips are formed similarly with the gaps uniformly positioned at one side thereof. The strips to be used as the longitudinal strips are spaced apart a distance equal to the spacing between gaps therein and they are arranged with the gaps **16** facing upwardly in the manner shown in the drawing. Similar strips to be used as transverse strips need only be inverted and rotated in a plane generally parallel to the longitudinal assembly until they freely intermesh in the manner previously defined for the embodiment of FIGURE 1.

The completed assembly may be imparted additional strength by subjecting the entire assembly to a brazing operation that effectively bonds the intermeshing portions of cooperating strips into an integral section. The formed portions of abuting strips comprise a skeletal column at the juncture of the intersecting strips which provides a base for the liquid brazing metal to effectively bond cooperating slit strips into an integral assembly.

In the same way one or both sides of a honeycomb section may be enclosed with metallic sheets to comprise a closed structural section having a high strength to weight relationship. Moreover the interstices formed between abutting strips may be filled with concrete, insulation or other material of castable form for ultimate use as floors or structural panels which require the insulation values, strength or mass of a filler.

While this invention has been defined with reference to the forms shown in the drawing and the usage defined in the specification, it should be apparent that other forms and applications might be readily devised without departing from the spirit of the invention. It is therefore intended that all matter contained in the accompanying drawings and defined in the accompanying specification shall be interpreted as illustrative only and not in a limiting sense.

We claim:

1. The method of making a honeycomb type assembly comprising the steps of providing a plurality of material strips having a common width, periodically slitting said strips in a straight course toward the opposite side thereof to provide longitudinal and transverse strips having a series of straight line slits at one side thereof, bending the material of said longitudinal strips adjoining said slits in opposite directions to provide a series of narrow gaps therein, bending the material of the transverse strips ad-

jacent said slits outwardly therefrom to the opposite hand from that of said longitudinal strips whereby the bent portions of the transverse and longitudinal strips do not interfere with one another during assembly, arranging an assembly of longitudinal strips with rows of gaps extending across said assembly, and inserting a series of transverse strips in said rows of gaps transverse to said longitudinal assembly with the gaps thereof in mutual engagement whereby the bent material of said strips provides a supporting structure at the juncture of said transverse and longitudinal strips in all four quadrants thereof.

2. The method of making a honeycomb type structure as defined in claim 1 wherein the slits are substantially normal to the length of said strips.

3. The method of making a honeycomb type structure as defined in claim 1 wherein the gaps formed from said slits are substantially equal to the thickness of said strips extending transverse thereto.

4. The method of making a honeycomb type structure as defined in claim 1 wherein the material adjoining both sides of said slits is bent outward therefrom to form said gaps.

5. The method of making a honeycomb type structure as defined in claim 1 wherein the material at one side of each slit is bent outward therefrom to form said gaps.

6. The method of making a honeycomb type structure as defined in claim 1 wherein the cooperating slits of adjacent transverse and longitudinal strips are together at least as long as the width of each strip.

7. The method of making a honeycomb type structure as defined in claim 1 wherein a bonding agent is applied to the juncture between transverse and longitudinal strips to integrally bond said strips into a composite structure.

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