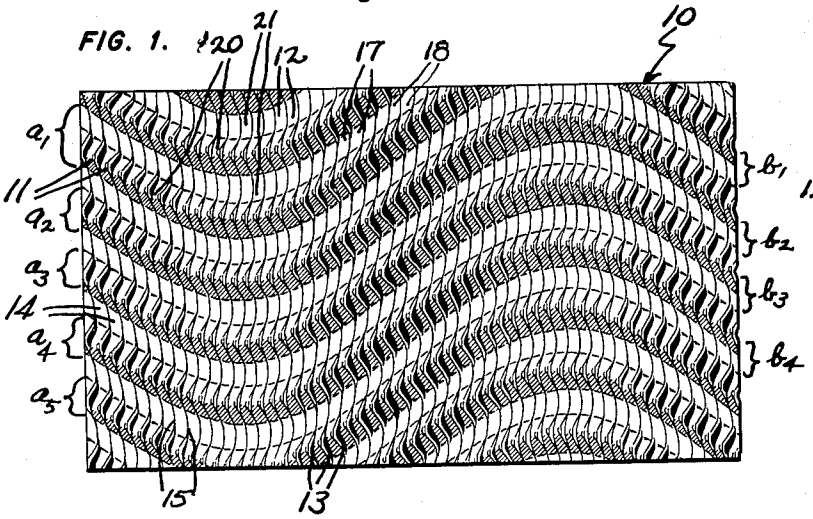
June 7, 1966 U. BENDER 3,254,968

METAL SHEET

Original Filed July 19, 1963

FIG. 1.



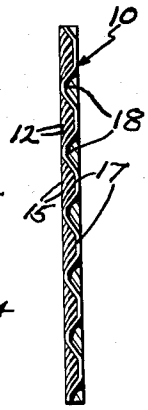


FIG. 2.

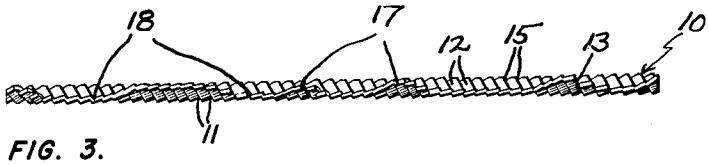


FIG. 3.

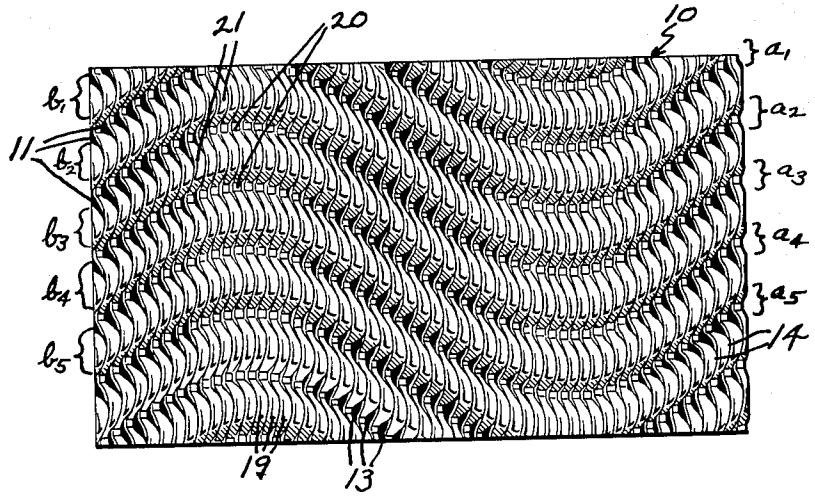


FIG. 4.

ULRICH BENDER
INVENTOR

BY Howard S. Blodgett
ATTORNEY

United States Patent Office

3,254,968

Patented June 7, 1966

3,254,968

METAL SHEET

Ulrich Bender, Geisweid, Germany, assignor to Designers Metal Company, a Division of Pentron Electronics Corporation, Hammond, Ind., a corporation of Illinois

Continuation of application Ser. No. 296,404, July 19, 1963. This application Dec. 31, 1964, Ser. No. 425,375

1 Claim. (Cl. 29—183)

This is a continuation of application Serial No. 296,404, filed July 19, 1963, now abandoned.

This invention relates to a metal sheet and, more particularly, to an ornamental sheet carrying apertures which is useful in building construction and other purposes.

It is common to form ornamental metal sheet by piercing the sheet with slits and then stretching the sheet transversely of the slits to form openings. For the most part, these openings between neighboring strips of metal are in the form of a rhombus or a parallelogram. Furthermore, due to the nature of the formation of the sheet, four strips always come together to form a junction. Metal sheets have also been known in which the openings are rectangular and are located side by side so that the junctions are positioned between the adjacent rows of strip to form a straight line. These types of metal sheets can be used only in a small number of forms for ornamental and structural purposes. On the other hand, because the distance between the individual strips in relation to their width is so great and because the junctions are quite a distance apart and line up only in certain lengthwise and transverse lines, the net effect is that there are a comparatively large number of rough and sharp edges on the surface which prevent the use of this type of metal sheet for useful ornamentation because of the danger of injury or tearing of clothes. By reducing the size of the openings, the rough surface could be reduced to a certain degree, but there is still a roughness on the surface because the junction points line up lengthwise and transversely of the sheet. These and other difficulties experienced with the prior art constructions have been obviated in a novel manner by the present invention.

It is, therefore, an outstanding object of the invention to provide a metal sheet which does not have the disadvantage of roughness of surface and, therefore, may be useful in ornamentation of buildings and the like.

Another object of this invention is the provision of a metal sheet of considerable strength-to-weight ratio.

A further object of the present invention is the provision of a metal sheet of extremely pleasant appearance.

A further object of the present invention is the provision of a metal sheet having a high degree of stiffness.

With these and other objects in view, as will be apparent to those skilled in the art, the invention resides in the combination of parts set forth in the specification and covered by the claims appended hereto.

The character of the invention, however, may be best understood by reference to one of its structural forms, as illustrated by the accompanying drawings in which:

The single figure shows an enlarged view of a portion of a metal sheet embodying the principles of the present invention.

In order to accomplish the objects of this invention, the metal sheet consists in general of an arrangement in which the junctions are arranged in the direction of the length of the sheet in the form of sine wave lines. By doing this, the junctions between the individual strips are located at such a displaced position with respect to each other that within a small area quite a large number of junctions in the plane of the sheet overlap one another and thereby form a fine mesh surface without sharp distinct edges. The evenness of the surface of this metal sheet in this design comes about also because of the fact

that the junctions are provided with impressed ribs constituting extensions of the strips. Furthermore, there is a practical advantage in forming the strips in an elevation other than the junctions, in giving them a direction extending transversely to the wave-shaped path of the junctions, and in providing them with a sharp distinctive crest and a broad wave trough. Metal sheets of especially high stability are formed by providing the sheet with uncut zones in the form of stripes which are more or less regularly spaced and in which the strips are indicated by impressed grooves. It is advantageous that these uncut zones cross the sine wave path of the junctions either in the crests of the sine wave or in their troughs. It is also advantageous to reduce gradually the width of the openings between the strips as one progresses to areas more closely adjacent to the uncut zones. The roughness of the surface of the metal sheet is reduced by providing that the openings and the strips between them extend at symmetrical angles to one another on opposite flanks of a sine wave.

Referring to the drawing, the metal sheet, indicated generally by the reference numeral **10**, is made in the usual way from a thin metal sheet. In the preferred embodiment, the sheet is aluminum, but it could be steel, or other metals. The sheet is formed with penetrating cuts **11** each having a pre-determined length and with the cuts arranged in a pre-determined manner. The sheet is then stretched so that openings **13** between the remaining strips **12** are created. The cuts **11** (which penetrate the sheet metal completely) are arranged in adjacent rows *a*1, *a*2, *a*3, *a*4, *a*5, and so forth; the ends of the cuts terminate a suitable distance from one another so that between the neighboring rows of cuts are provided uncut zones *b*1, *b*2, *b*3, *b*4, and so forth. It is in these uncut zones that the individual strips **12** form the junctions **14** and the material of the sheet remains connected.

As can be seen from the drawing, the cuts **11** in the sheet are arranged in such a manner that the rows *a*1 to *a*5 and the uncut zones *b*1 to *b*4, which lie between the rows of cuts and which make possible the forming of the junctions **14** are arranged in the form of a sine wave path. The uncut zones *b*1 to *b*4 between the adjacent rows of cuts *a*1 to *a*5 are, as can be seen in the drawing, provided with impressioned grooves **15** so that, in the uncut zones *b*1 to *b*4, ribs **16** are formed which indicate visually the passage of the strips **12** from one adjacent row of cuts to the other. Furthermore, the drawing shows that the junctions **14** of the individual strips lie in a different plane from the ribs which are created by the impressioned grooves **15**. This results in a metal sheet in which the strips **12** extend transversely to the sine wave path of the junctions **14** and are formed in the wave lines with sharp crests **17** and broad wave troughs **18**.

At more or less regular spacing, the metal sheet contains uncut stripes **19** on which the strips **12** are also indicated by impressed grooves. The path of these uncut stripes **19** crosses the sine wave path of the junctions **14** in the wave crests **20** and in the wave troughs **21**.

The openings **13** which are located between the strips **12** are reduced in width as one progresses from the center of the flanks of the wave path of the junctions **14** (uncut zones *b*1 to *b*4); in other words, as the openings **13** are closer to either the crests **20** of the sine wave or closer to the troughs **21**, they are reduced in size, as is evident in the drawing. Furthermore, the strips **12** and the openings **13** on the same wave extend in exactly opposite angles to the flanks on either side of a crest **20**; that is to say, they extend at equal angles to a longitudinal line (for instance, the line of a stripe **19**) but at opposite sides of that line and, therefore, are symmetrical. According to the invention, the metal sheet is formed with relatively steep, sharply impressed wave runs in the rows *a*1 to *a*4 of cuts

11, but in the junction zones *b*1 to *b*4 which are positioned between them, the wave runs are broad. Furthermore, the cuts are relatively long in the zones *a*1 to *a*5 so that this results in a coarse mesh. Naturally, it also is possible to make rows of cuts with much flatter sine waves and to make the cuts 11 shorter and arrange them closer together so that a fine mesh metal sheet is created with a fine ribbed or fine link-formed surface.

It can be seen that the construction in the manner described above results in a metal sheet which is extremely stiff and cannot be bent, particularly in the transverse direction, without difficulty. The strength-to-weight ratio is very high and yet the surface has a fine ornamental configuration which is not rough and which will not injure or tear the clothing of a person who rubs against it.

It is obvious that minor changes may be made in the form and construction of the invention without departing from the material spirit thereof. It is not, however, desired to confine the invention to the exact form herein shown and described, but is desired to include all such as properly come within the scope claimed.

The invention having been described, what is claimed as new and desired to secure by Letters Patent is:

Metal sheet, comprising a body having a series of parallel scores extending in one direction, a series of ridges in the form of sine waves extending parallel to each other and transversely of the scores, the scores being formed into openings located on the ridges, the openings on a particular ridge being located in groups, the groups being located only on the portions of the sine waves between the peaks and valleys.

References Cited by the Examiner

UNITED STATES PATENTS

2,369,128	2/1945	Bartsch	29—180
2,891,303	6/1959	Stevenson	29—183
3,049,796	8/1962	Pall	29—183.5
3,155,460	11/1964	Mears	29—183.5

DAVID L. RECK, *Primary Examiner.*

RICHARD DEAN, *Assistant Examiner.*