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3,133,795

RIGIDIZED PANELS

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FIG. 1

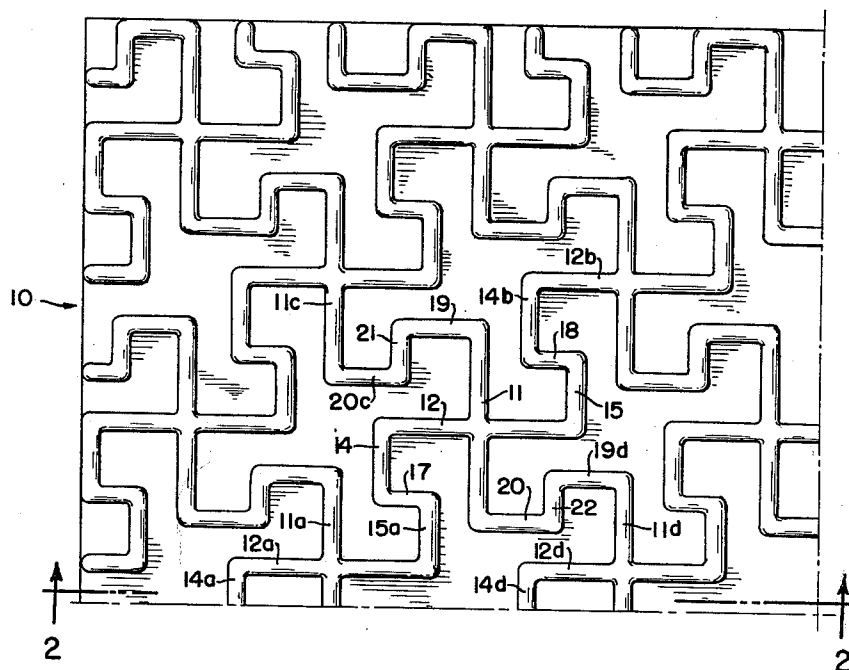
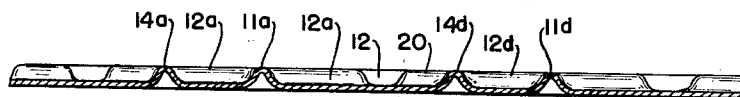


FIG. 2



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RIGIDIZED PANELS

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4 Claims. (Cl. 29—180)

The invention relates to rigidized panels for archi-
tectural uses and the like and, more particularly, to a
panel formed with a unique pattern of continuously con-
nected elongated raised portions which provide improved
resistance to bending and other distortion of the panel.

Since flat sheets and panels are often unsuitable for
certain architectural uses due to their susceptibility to
bending, various patterns of bosses, corrugations, and
other raised portions are sometimes formed in such
articles to render them more rigid. The present inven-
tion improves over conventional rigidized panels of this
type in that it provides a pattern in which the raised
portions are so arranged to achieve maximum rigidity
against bending stresses.

Broadly stated, the rigid panel of the invention com-
prises a sheet formed with a network of non-rectilinear
elongated raised portions. Each elongated raised portion
consists of a plurality of rectilinear segments continuously
connected end-to-end at right angles to the adjoining seg-
ments. This network of raised portions defines a plurality
of flat separated uniformly shaped multi-sided surfaces.
The term "multi-sided" as used herein defines a surface
having more than four sides.

In a particularly advantageous form of the new panel,
the above-mentioned network consists of a plurality of
regularly repeated patterns of certain adjoining segments
from two of the elongated raised portions, each pattern
consisting of two equal-length crossed segments taken
from the associated two raised portions and bisecting
each other at right angles to define quadrants. Inter-
mediate segments extend at right angles from the respec-
tive outer ends of the two crossed segments into the re-
spective quadrants. These intermediate segments have
a length less than one-half that of the crossed segments.
Linking segments extend at right angles from the respec-
tive outer ends of the intermediate segments into the
quadrants associated therewith, and each linking segment
is connected to the outer end of a similar intermediate
segment of an adjacent pattern.

This new arrangement of raised portions on a rigidized
panel has been found to achieve much greater resistance
to bending than the conventional designs and patterns of
raised portions commonly employed. The rigidized
sheets and panels presently available characteristically in-
clude separate discontinuous raised portions, or intercon-
nected raised portions which define either simple rec-
tangular flat areas or complex flat areas of different
shapes and sizes bounded by edges which are not uni-
formly at right angles to one another. The precise tech-
nical reason for the improved performance of the new
design in resisting bending has not been specifically deter-
mined but it seems that its superior rigidity is principally
due to the fact that the segments of the elongated raised
portions are rectilinear and connected at right angles and
also that the flat surfaces defined thereby are separated,
uniformly shaped, and have more than four sides. Sub-
stantial departure from these features of the present struc-
ture results in a marked reduction in the rigidity of the
article.

To a large extent, the increased rigidity of the new
panels also results from the fact that all segments of every
elongated raised portion are projected along co-ordinate
axes of the panel in a regularly repeated uniform ar-
rangement, and thus there are no dominant lines of bend-

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ing weakness extending through any part of the panel.
In this regard, it is to be noted that a straight line pro-
jected across one of the new panels intersects all seg-
ments of the raised portions at the same angle and passes
through identical flat surface areas which are equal in
size and shape. This combination of uniformity and
complexity within a network of co-ordinate axes might
perhaps explain the marked improvement in rigidity em-
bodied therein as compared to known rigidized panels.

A preferred embodiment of the rigidized panel of the
invention is described hereinbelow with reference to the
accompanying drawing, wherein

FIG. 1 is a plan view of a fragment of a panel having
raised portions formed therein according to the pattern
of the present invention; and

FIG. 2 is a section taken along line 2—2 of FIG. 1.

Referring initially to FIG. 1, a metal sheet 10 is shown
formed with a network of raised portions arranged in a
new design such that maximum resistance to bending
stresses is provided. The network includes one basic
regularly repeated pattern which consists of a longitudinal
segment 11 and a transverse segment 12 of equal length
which bisect each other at right angles and substantially
define rectilinear co-ordinate axes on the metal sheet. At
the ends of the transverse segment 12, intermediate seg-
ments 14 and 15 extend normally therefrom substantially
into the first and third quadrants respectively which are
defined by the crossed segments 11 and 12. The seg-
ments 14 and 15 have a length less than one-half the
length of either of the crossed segments. Extending nor-
mally from the segments 14 and 15 in a direction toward
the segment 11 are linking segments 17 and 18
which have a length less than the length of the inter-
mediate segments 14 and 15. Connected to the linking
segments and extending normally therefrom are inter-
mediate segments 15a and 14b of adjoining patterns. The
segments 15a and 14b are in turn continuously connected
to crossed segments 12a and 12b, and hence this design
repeats itself across the sheet in a substantially stepped-
diagonal arrangement.

Extending normal to the ends of the crossed segment 11
substantially into the second and fourth quadrants de-
fined by the crossed segments 11 and 12 are intermediate
segments 19 and 20. The segments 19 and 20 are equal
in length to the intermediate segments 14 and 15 and have
linking segments 21 and 22 extending normally from their
respective ends. Connected to the linking segments 21
and 22 are intermediate segments 20c and 19d of adjoining
patterns. The segments 20c and 19d are in turn contin-
uously connected to longitudinal segments 11c and 11d
and this design also repeats itself on a substantially
stepped-diagonal arrangement across the metal sheet. A
plurality of flat uniformly shaped multi-sided surfaces
23 are also defined by this network of projections.

Predominantly weak lines of bending on the metal
sheet of the invention are non-existent, and therefore
maximum rigidity against bending stress is attained, as a
result of the raised portions being continuously connected
according to the above pattern.

This new pattern may be formed in sheets of metal,
plastic, or other materials suitable for use in rigidized
panels. Also, while the panels serve principally for
architectural purposes, they can have many other struc-
tural applications. The raised portions may be embossed
on the sheet by being formed in relief on one side there-
of with the opposite side either flat or similarly embossed.
Preferably, however, the raised portions are rolled or
stamped into the material of the sheet so that their mirror
image appears on the reverse side thereof in the form of
concave depressed portions. In this regard, it is particu-
larly advantageous to cut the new panels from rolled
sheets of indefinite length. Consequently, both the panels

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and the sheets from which the panels are formed are within the scope of this invention. The various elongated raised portions may extend either diagonally relative to the centerline of such indefinite length sheets or they may extend transversely and longitudinally relative thereto.

I claim:

1. A rigidized panel for architectural uses and the like comprising a sheet formed with a network of nonrectilinear elongated raised portions, each elongated raised portion consisting of a plurality of rectilinear segments continuously connected end-to-end at right angles to the adjoining segments, said network of raised portions defining a plurality of flat separated uniformly shaped multi-sided surfaces, said network consisting of a plurality of regularly repeated interconnected patterns each consisting of at least two cross segments taken from two respective elongated raised portions.

2. A rigidized panel for architectural uses and the like comprising a sheet formed with a network of nonrectilinear elongated raised portions, each elongated raised portion consisting of a plurality of rectilinear segments continuously connected end-to-end at right angles to the adjoining segments, said network of raised portions defining a plurality of flat separated uniformly shaped multi-sided surfaces, said network consisting of a plurality of regularly repeated pattern each consisting of at least two crossed segments taken from two respective elongated raised portions, intermediate segments extending at right angles from the respective outer ends of the two crossed segments, and linking segments extending at right angles from the respective outer ends of the intermediate segments, each linking segment being connected to the outer

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end of a similar intermediate segment of an adjacent pattern.

3. A rigidized panel for architectural uses and the like comprising a sheet formed with a network of non-rectilinear elongated raised portions, each elongated raised portion consisting of a plurality of rectilinear segments continuously connected end-to-end at right angles to the adjoining segments, said network of raised portions defining a plurality of flat separated uniformly shaped multi-sided surfaces, said network consisting of a plurality of regularly repeated patterns each consisting of two equal-length crossed segments taken from two respective elongated raised portions and bisecting each other at right angles to define quadrants, intermediate segments extending at right angles from the respective outer ends of the two crossed segments into the respective quadrants, said intermediate segments having a length less than one-half that of said crossed segments, and linking segments extending at right angles from the respective outer ends of the intermediate segments into the quadrants associated therewith, each linking segment being connected to the outer end of a similar intermediate segment of an adjacent pattern.

4. A sheet of indefinite length formed with said network of non-rectilinear raised portions as defined in claim 3.

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