March 7, 1972 G. CARRILLO ET AL 3,647,645

METHOD FOR SELECTIVE ANODIZING OF PERFORATED PANELS

Filed Nov. 14, 1969

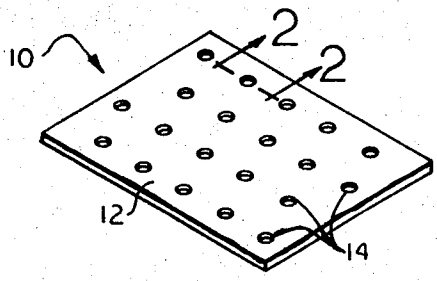


FIG. 1

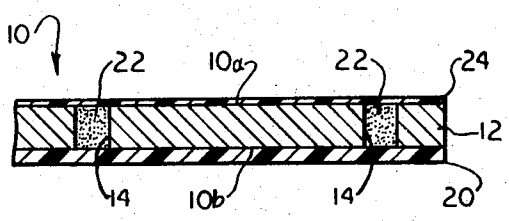


FIG. 5

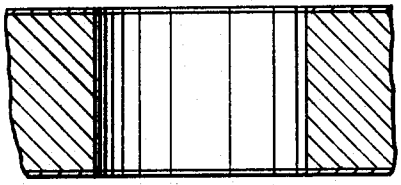


FIG. 2

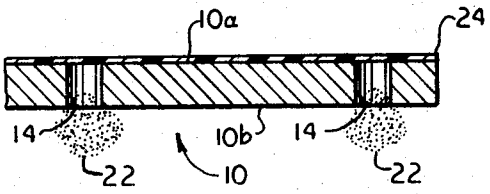


FIG. 6

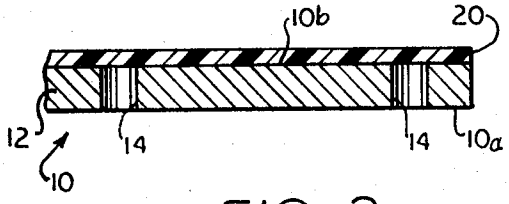


FIG. 3

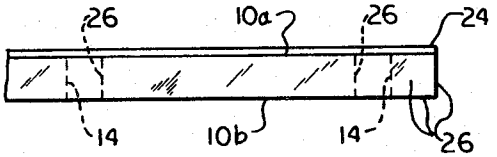


FIG. 7

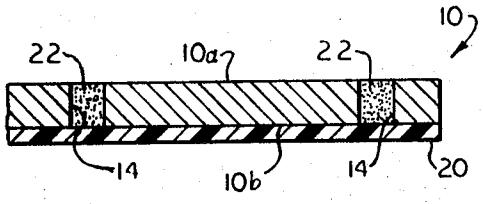


FIG. 4

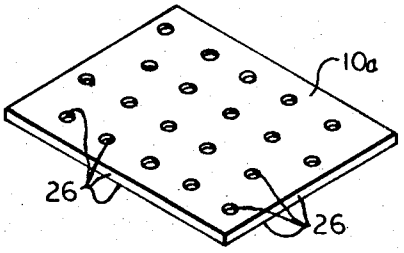


FIG. 8

INVENTOR.
GILBERTO CARRILLO
BY WILLIAM D. BROWN

George E. Pearson
ATTORNEY

United States Patent Office 3,647,645 Patented Mar. 7, 1972

3,647,645

METHOD FOR SELECTIVE ANODIZING OF PERFORATED PANELS

Gilberto Carrillo and William D. Brown, Riverside, Calif., assignors to Rohr Corporation, Chula Vista, Calif.

Filed Nov. 14, 1969, Ser. No. 876,863
Int. Cl. C23b 5/48; B44c 1/04
U.S. Cl. 204—15 8 Claims

ABSTRACT OF THE DISCLOSURE

A method for anodizing only a selected side, edges and the interiors of perforations of a perforated panel, in which a pressure sensitive tape is applied to the selected side of the panel and over the perforations. A filler is placed in the perforations from the opposite side of the panel over which a maskant is applied. The tape is then removed and the panel is tapped and rinsed to remove the filler, after which the masked panel is anodized. The maskant is then removed from the panel.

BACKGROUND OF THE INVENTION

The present invention relates to the fabrication of adhesively bonded sound suppression structures, and more particularly to the selective anodizing of perforated panels providing skin metal facings for metal honeycomb sound suppression structures.

The panels are made from metal sheet stock, usually an aluminum alloy clad on both sides with aluminum, and predeterminedly spaced perforations are formed therein, as by punching or the like. This bares the alloy in the interiors of the perforations and so for protective reasons the panels are required to be anodized. In the case where the panel is not an appearance item, that is, it is not open to view, the entire panel is anodized. However, the anodizing causes a color change in the metal of the panels. Thus, where the panel is an appearance item, total anodization is undersirable and not acceptable. For this reason, the surface of the panel open to view must remain unanodized, and be kept free of any leakage of anodizing solution thereto which would cause a color change.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a perforated panel in which only the interiors of the perforations and a selected side and edges of the panel are protectively coated. A further object is to provide a method for selectively treating perforated panels, such as chemically, electrolytically, and the like.

Another object is to provide a method for selectively treating perforated panels which is reliable in operation.

Still another object is to provide a method for anodizing a perforated panel in which only the edges and a selected side of the panel and the interiors of the perforations are anodized.

These and other objects and advantages are achieved by the provision of a selectively anodized perforated panel and a method and means for selectively anodizing a perforated panel in which the panel is cleaned, if necessary, a covering is applied to a selected side of the panel, a filler is placed in the perforations, a maskant is applied to the opposite side over the perforations, the covering and filler are removed, and the panel is anodized, after which the maskant is removed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary perspective view of a perforated panel prior to treatment.

FIG. 2 is a greatly enlarged sectional view along line 2—2 of FIG. 1.

FIG. 3 is a sectional view of the panel showing a selected side thereof covered with tape.

FIG. 4 is a view similar to FIG. 3 but showing the panel inverted and the perforations thereof filled with filler material.

FIG. 5 is a view similar to FIG. 4 showing the application of a masking film over the perforations and the panel side that is to remain unanodized.

FIG. 6 is a sectional view of the panel with the covering tape removed and the panel inverted for removal of the filler material from the perforations.

FIG. 7 is an end view showing the panel after anodization of all surfaces except the appearance side.

FIG. 8 is a fragmentary perspective view of a perforated panel in accordance with the present invention.

DESCRIPTION OF THE EMBODIMENTS

In the fabrication of one form of sound suppression structures for aircraft, perforated metal panels providing skin facings are adhesively bonded to metal honeycomb structures. Referring to FIG. 1, there is shown a perforated panel **10** made of sheet metal stock **12** having perforations **14** there though for sound attenuation and suppression. As better seen in FIG. 2, the sheet metal stock has a central body of aluminum alloy **16** having a substantial thickness. The aluminum alloy body is clad on both sides with thin layers or coatings **18** of aluminum. Obviously, perforating the panel, as by punching or the like, bares the alloy in the interiors of the perforations. To protect against corrosion or other undesired conditions, the panel is required to be anodized. Unfortunately, the anodizing causes an undesirable color change in the metal. Where the panel is hidden from view, the color change is of no consequence. However, where the panel is an appearance item, that is, it is open to view, color change is unacceptable by the customer and must be avoided. To this end, the method of the present invention has been devised and used for the selective anodizing of the hidden side of the panel and the interiors of the perforations and providing an acceptable perforated panel.

The perforated panel **10** is received in a clean condition or cleaned for selective anodizing by vapor degreasing, immersion and spray rinsing with demineralized water, and drying with hot circulating air, as necessary.

A determination is made as to which side will be the appearance side **10***a* and must remain unanodized. The other side **10***b* is then selected for subsequent anodization, and a layer of covering material **20**, such as pressure sensitive tape, or the like, is applied to the selected side **10***b* over the perforations **14**, as shown in FIG. 3. Preferably, a hard rubber roller is used to smooth out the tape so that wrinkles or voids between the tape and the panel are avoided.

As shown in FIG. 4, the panel **10** is inverted and the perforations **14** are completely filled with a non-corrosive filler **22** selected from the class including polyvinyl alcohol solutions, dry precipitated calcium cabonate, powdered chalk, finely divided silica, powdered talc, ground tripoli, and the like. All excess filler is brushed away, taking care not to disturb the filler in the perforations.

Immediately afterward, a maskant **24** to the side **10***a* that is to remain unanodized, as shown in FIG. 5. The maskant can be in the form of a chemical resistant film, such as coatings of neoprene or vinyl or the like, applied by dipping, brushing or spraying. The maskant is air dried between each coat and finally oven cured, if necessary.

The masked panel **10** is cooled to room temperature, if necessary, and the tape **20** is peeled from the panel, uncovering the perforations **14**. The panel is inverted and tapped gently to cause the filler **22** to fall out of the per-

forations, as shown in FIG. 6, following which the panel is pressure rinsed with water to remove any remaining filler.

The panel, with the side **10***a* masked by the film **24**, is then anodized in accordance with standard procedures, whereby only the edges and selected side **10***b* of the panel and the interiors of the perforations **14** are anodized as shown in FIG. 7. The panel is thus provided with an anodized protective coating **26** on all surfaces except the appearance side **10***a* which remains unanodized.

In due course, the masking film **24** is removed, as shown in FIG. 8, thus providing a selectively treated perforated panel in accordance with the present invention. It is to be noted that, except for the appearance side **10***a*, all other surfaces of the panel, including the interiors of the perforations, have an anodized protective coating **26**.

In summary, the steps of the method of the present invention are basically:

(A) Cleaning the perforated panel, if necessary.
(B) Covering a selected side of the panel.
(C) Placing a filler in the perforations.
(D) Applying a maskant over the opposite side of the panel.
(E) Uncovering the selected side.
(F) Removing the filler from the perforations.
(G) Selectively treating the edges and selected side of the panel and the interiors of the perforations.
(H) Unmasking the selectively treated panel.

There has thus been provided a selectively anodized perforated panel and a reliable method for selectively anodizing only the edges and hidden side thereof and the perforations therein.

Although the present invention has been herein shown and described in what are considered the most practical and preferred embodiments, it is recognized that departures may be made therefrom in light of the above teachings without departing from the spirit of the invention as defined in the appended claims.

What is claimed as new and useful and desired to be secured by U.S. Letters Patent is:

1. A method for selectively treating perforated panels comprising the steps of:
(a) applying a layer of covering material to a selected side of the panel;
(b) placing a filler in the perforations;

(c) applying a maskant to the opposite side of the panel and over the filler in the perforations;
(d) removing the covering material from the panel and the filler from the perforations; and
(e) treating the panel;
whereby only the unmasked portions of the panel and the interiors of the perforations are treated.

2. The method of claim **1** in which the panel is treated in a chemical solution.

3. The method of claim **1** in which the solution is an anodizing solution.

4. The method of claim **1** in which the covering material includes pressure sensitive tapes and films.

5. The method of claim **1** in which the filler includes polyvinyl alcohol solutions, powdered materials such as calcium carbonate, chalk, finely divided silica, ground tripoli and talc.

6. The method of claim **1** in which the maskant includes chemical resistant films such as coatings of neoprene and vinyl.

7. The method of claim **1** in which the covering material includes pressure sensitive films and the like; the filler includes polyvinyl alcohol solutions, powdered materials such as calcium carbonate, chalk, finely divided silica, ground tripoli, talc, and the like; the maskant includes chemical resistant films such as coatings of neoprene and vinyl; and the panel is treated in an anodizing solution.

8. The method of claim **1** in which the filler is removed by tapping the panel to cause most of the filler to fall out of the perforations and the panel is rinsed with demineralized water to wash out any filler remaining in the perforations.

References Cited

UNITED STATES PATENTS

3,494,840	2/1970	Dedrick et al.	204—58
2,668,936	2/1954	Robinson	317—258
3,270,401	9/1966	Staley et al.	204—58
3,065,152	11/1962	Douglass et al.	204—18
3,284,321	11/1966	Fromson	204—58

JOHN H. MACK, Primary Examiner
T. TUFARIELLO, Assistant Examiner

U.S. Cl. X.R.
204—18, 24