

July 11, 1972

D. V. BEAVER

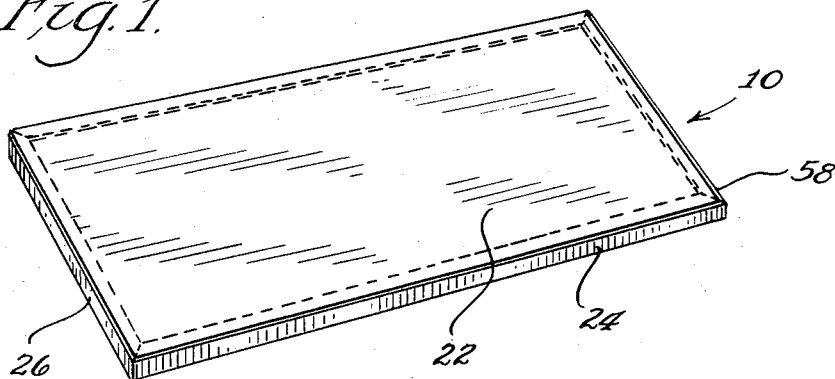
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SANDWICH TOP CONSTRUCTION FOR OFFICE FURNITURE

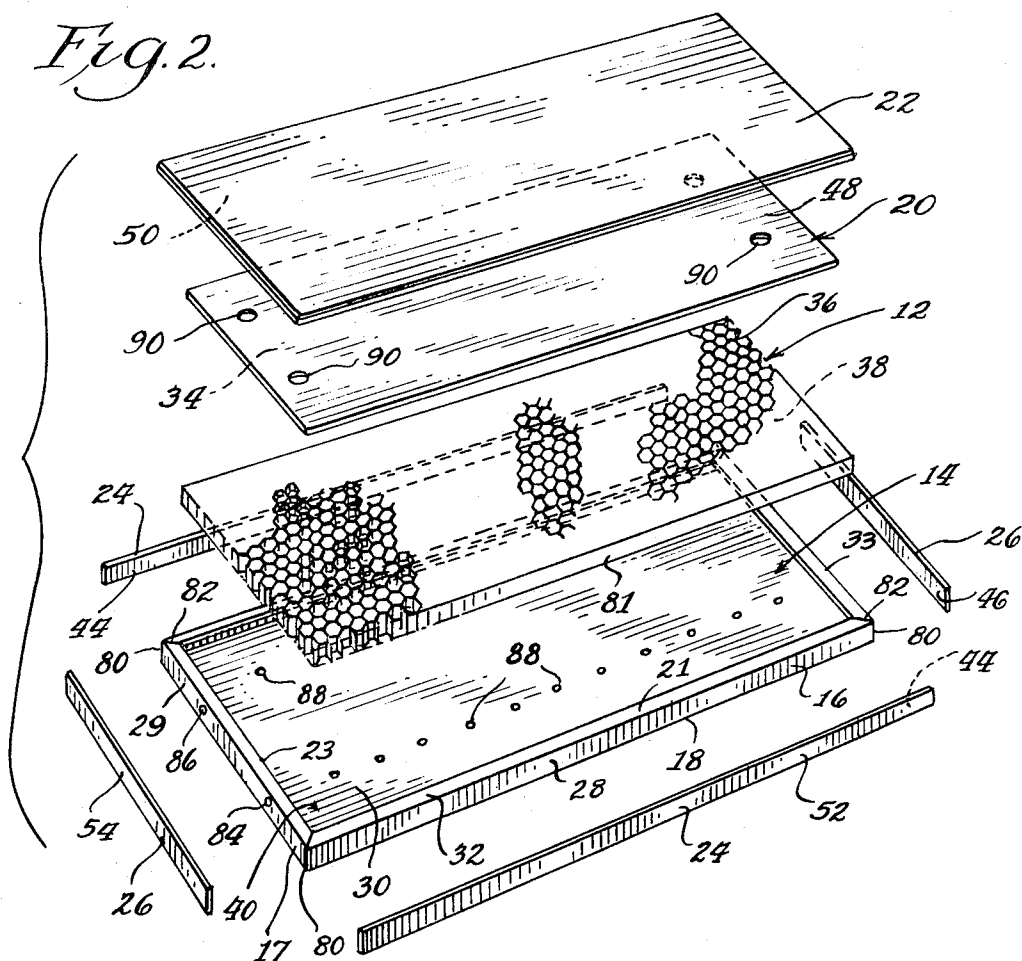
Filed June 10, 1970

3 Sheets-Sheet 1

*Fig. 1.*



*Fig. 2.*



*Inventor*  
*Donald V. Beaver*

*By* *Mann, Brown, McWilliams & Broadway*  
*Attys.*

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D. V. BEAVER

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3 Sheets-Sheet 2

Fig. 3.

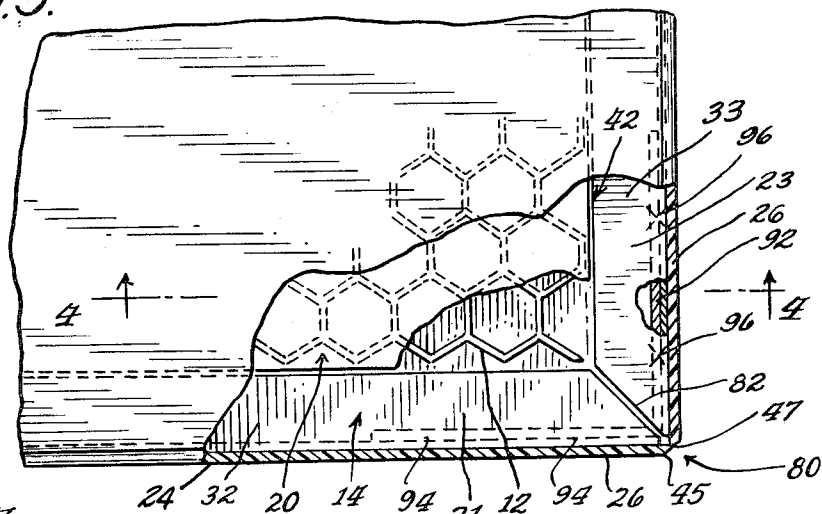


Fig. 4.

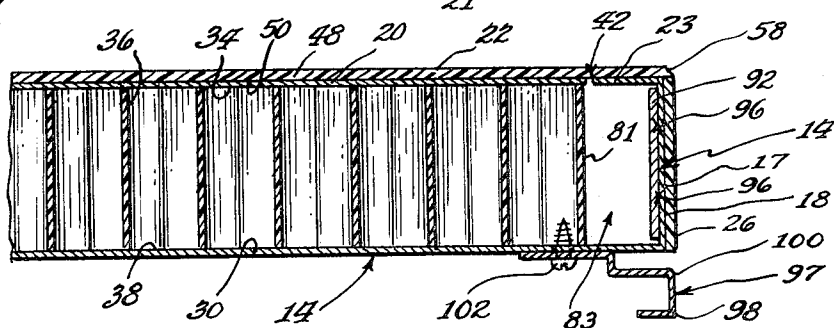
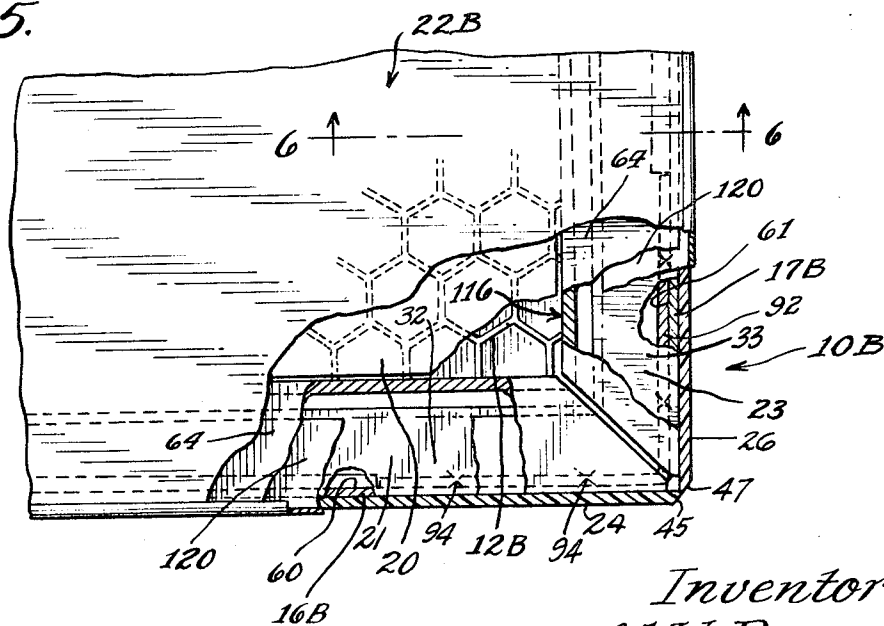


Fig. 5.



Inventor  
Donald V. Beaver

By Mann, Brown, McWilliams & Bradway  
Attys.

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**D. V. BEAVER**

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## SANDWICH TOP CONSTRUCTION FOR OFFICE FURNITURE

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3 Sheets-Sheet 3

*Fig. 7.*

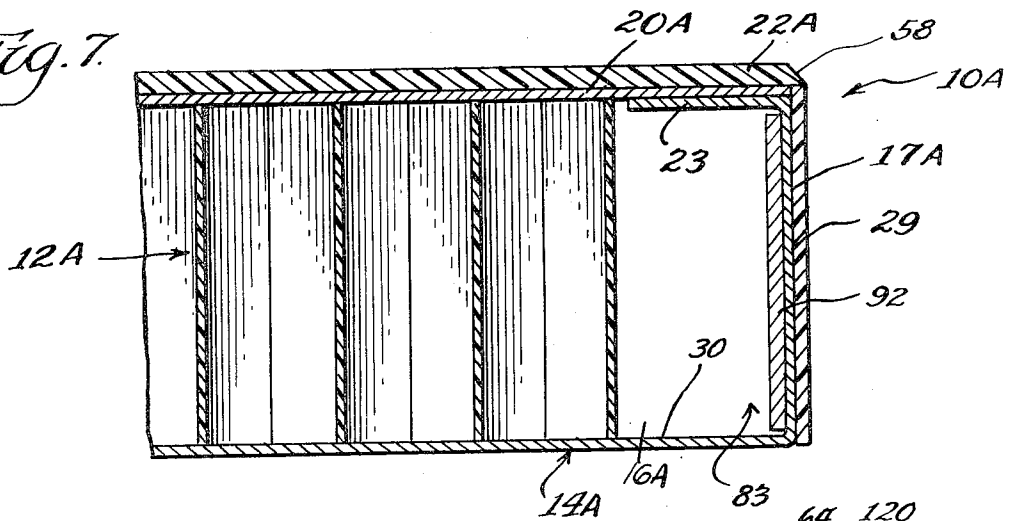
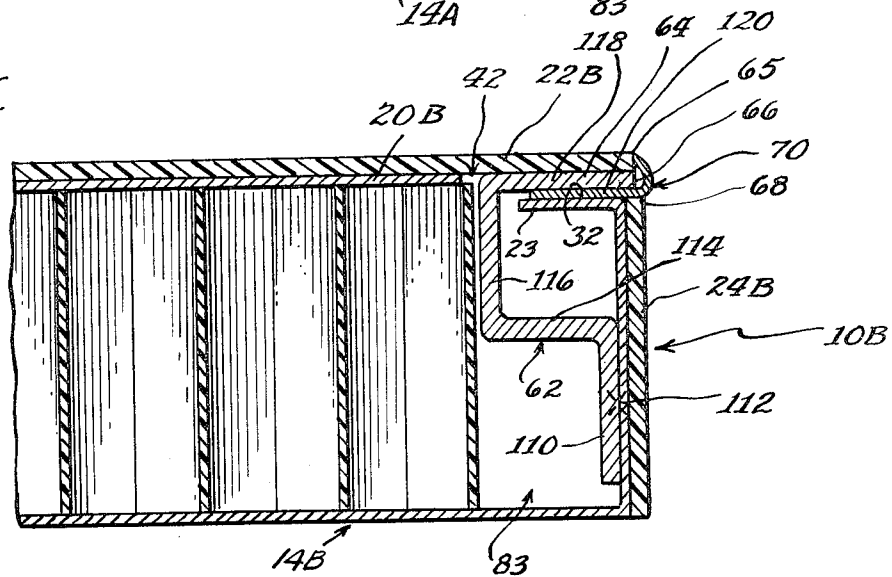
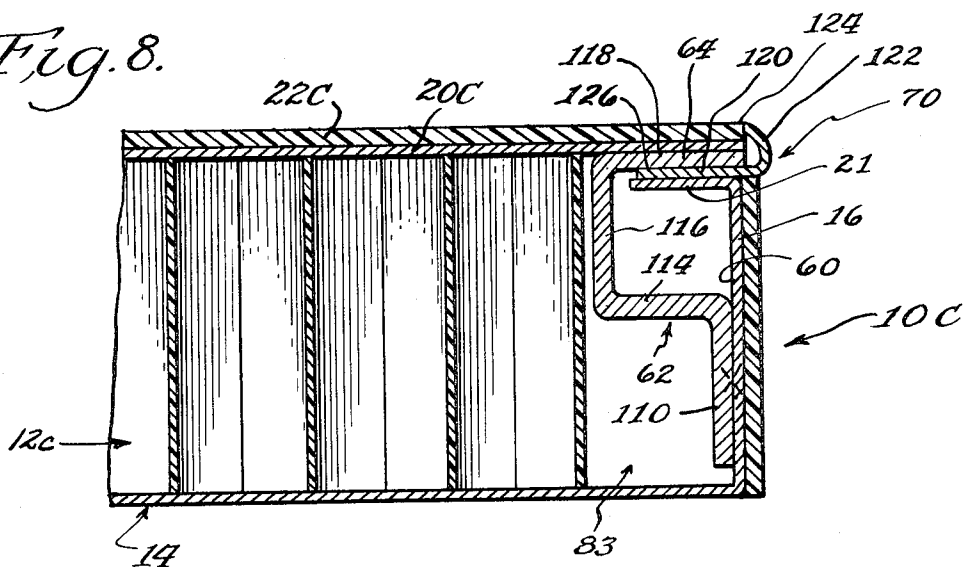


Fig. 6.



*Fig. 8.*



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**SANDWICH TOP CONSTRUCTION FOR  
OFFICE FURNITURE**  
Donald V. Beaver, Brookfield, Ill., assignor to  
All-Steel Equipment Inc.  
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Int. Cl. B32b 3/12; E04c 2/00; A47b 13/08  
U.S. Cl. 161—44 **10 Claims**

## ABSTRACT OF THE DISCLOSURE

A top structure for office furniture such as desks, tables, and credenzas, which is of a sandwich construction comprising a bottom plate defining upstanding marginal walls about its rim each including an inturned flange with the flanges being in coplanar relation, a cellular filler or core structure bonded to the bottom plate within but extending short of the bottom plate marginal walls, a top plate bonded to the core structure, and sheets of finishing material bonded to the top plate and side surfaces defined by the bottom plate walls in close fitting relation.

This invention relates to tops for office furniture such as desks, tables and credenzas, and more particularly, relates to an improvement over the desk top construction of Grube Pat. 2,911,274.

In accordance with the desk top construction shown in the Grube patent, the desk top comprises top and bottom metal plates formed with opposed edge flanges that receive between same a cellular filler structure to which both plates are bonded. A finishing sheet is bonded to the upper surface of the top sheet, and the opposed flanges of the top and bottom sheets are masked by a decorative edging which consists of a rigid strip which is fastened in place by the screws that secure the said flanges together and the screws are covered by an additional resilient decorative edging strip. This basic top arrangement has many advantages, an important one being a high strength to weight ratio.

A principal object of this invention is to provide a top construction that eliminates the two piece decorative edging and upper and lower plate flange securement of the Grube patent.

Another principal object of the invention is to provide a top construction in which the lower plate receives and houses the cellular core, and the upper plate is a simple flat plate.

Yet another principal object of the invention is to provide an improved method of making a top construction that insures a strong light weight structure of uniform characteristics.

Other objects of the invention are to provide a top construction for office furniture that is readily adapted to low cost assembly line techniques, that employs contact cement or other adhesive systems to bond the various parts together, and that is economical of manufacture, convenient to install, and adapted for use in a number of different types of furniture as a top therefor.

In accordance with this invention, the top comprises a bottom plate formed to define an upstanding marginal wall about its rim each including an inturned flange disposed in the plane of the top and in coplanar relation with each other, a cellular filler or core received in and bonded to the bottom plate and having its marginal configuration fitting within the marginal configuration of the bottom plate inturned flanges, a planar upper plate bonded to the core or filler, and a sheet of finishing material, such as linoleum, bonded to the top plate and forming the top surface of the desk. In one embodiment, the upper plate is proportioned to fit within the marginal configuration

of the bottom plate inturned flanges and is disposed in the plane of the inturned flanges, while the finishing sheet is bonded to both the top plate and the bottom plate flanges and spans the gap between the top plate and the inturned flanges; in another embodiment the top plate extends over and is bonded to both the core and inturned flanges and the finishing sheet is substantially coextensive with and bonded to only the top sheet. One embodiment does not utilize the top plate at all, but rather bonds the finishing sheet directly to the core and inturned flanges of the bottom plate. The outer surfaces of the bottom plate marginal walls are covered with finishing sheets that may be of the same material as the top finishing sheet, and the top finishing sheet edge may be either beveled or masked by a novel bead arrangement herein disclosed.

Still other objects, uses and advantages will be obvious or become apparent from a consideration of the following detailed description and the application drawings, in which like parts are indicated by like numerals throughout the several views.

In the drawings:

FIG. 1 is a perspective view of a desk top arranged in accordance with this invention;

FIG. 2 is an exploded perspective view of the desk top of FIG. 1;

FIG. 3 is a fragmental plan view, on a greatly enlarged scale, of one corner of the desk top shown in FIGS. 1 and 2, with parts broken away to expose other parts;

FIG. 4 is a cross-sectional view taken substantially along line 4—4 of FIG. 3;

FIG. 5 is a view similar to that of FIG. 3 but illustrating a modified form of the invention;

FIG. 6 is a cross-sectional view taken substantially along line 6—6 of FIG. 5;

FIG. 7 is a view similar to that of FIG. 6 but illustrating a modified form of the embodiment of FIGS. 1—4; and

FIG. 8 is a view similar to that of FIG. 7 illustrating a similar modification of the embodiment of FIGS. 5 and 6.

However, it is to be understood that the specific drawing illustrations provided are supplied primarily to comply with the requirements of the Patent Code, and that the invention is susceptible of other embodiments which will be obvious to those skilled in the art.

## GENERAL DESCRIPTION

Reference numeral 10 of FIGS. 1 and 2 illustrates one embodiment of a desk top made or arranged in accordance with this invention which comprises (see FIG. 2) a honeycomb or cellular core or filler structure 12, a painted bottom sheet or pan 14 defining upstanding side marginal walls 16 and end marginal walls 17 about its rim 18, each in turn defining an inturned flange 21 and 23, respectively, with the respective flanges 21 being in coplanar relation, a planar painted top plate 20, a top covering or sheet 22 overlying top plate 20 that forms the working surface of the desk, and side and end decorative sheets or strips 24 and 26 which are applied to the outwardly facing surfaces 28 and 29, respectively, of the respective bottom plate marginal walls 16 and 17.

In accordance with this invention, the desk top components shown in FIG. 2 are assembled by running the bottom sheet 14 and the top sheet 20 consecutively through suitable contact glue spraying apparatus which sprays a contact cement of a suitable type on the bottom sheet floor surface 30 and the inturned flange upwardly facing surfaces 32 and 33 as well as the undersurface 34 of the top sheet 20. This may be done by passing these elements consecutively through a spraying machine, after which they are passed through a suitable heating arrangement to drive off the volatiles from the contact cement.

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The core 12 is also run through a suitable contact cement applying apparatus, such as a suitable roller coating arrangement, and preferably both of its sides 36 and 38 are treated in this manner. This may be done by moving the core structure down a conveyor arrangement which is parallel to the conveying mechanism for the top and bottom plates.

The bottom plate is preferably positioned with its surface 30 facing upright for spraying purposes, and at a suitable assembly point, the core of filler structure 12 is picked up and dropped into the space 40 defined by the bottom plate walls 16 and 17 and inturned flanges 21 and 23, and the top sheet 20 centered on top of the core 12 with its undersurface 34 in contact with the side 36 of the core, after which the assembly is passed through a heating arrangement to drive off any volatiles of the contact cement and then the assembled parts are run through a suitable pinching roller type clamping arrangement to press the top and bottom sheets against the respective sides 36 and 38 of the core structure as needed to provide a good bond and insure that the plates are in parallelism with each other. In the form of the top shown in FIGS. 1-4, the top plate 20 is proportioned to fit in coplanar relation with the bottom plate inturned flanges 21 and 23 (see FIG. 3), leaving a slight gap where indicated at 42 thereabout. Consequently, the pressure applying means, and the proportioning of parts should be such that the top plate 20 is disposed in coplanar relation with the inturned flanges 21 and 23 in the finished product.

The thus formed subassembly or slab then has the stripping or sheets 24 and 26 applied thereto, as by passing the subassembly through a suitable contact cement spraying machine which applies contact cement to the longitudinal side surfaces 28, with the strippings or sheetings 24 being similarly treated as to their respective surfaces 44; the strippings or sheets 24 are proportioned, however, to overlap the surfaces 28 at the upper and lower and side edges of their respective surfaces. Thereafter, the strippings or sheets 24 are centered on the respective walls 16 and the subassembly run through a pressure roller arrangement to insure firm bond between the stripping or sheets 24 and the bottom sheet marginal walls 16.

Thereupon the margins of the stripping or sheets 24 are ground flush with the top and bottom of the respective marginal walls 16, as by employing a suitable high speed milling cutter; the side edges of sheets 24 are beveled, as indicated at 45 in FIG. 3, as by employing a similar type of grinding device. The sheets or strippings 26 are applied to the side marginal walls 17 in like manner. Thus, the sheets or strippings 26 are proportioned to overlie the upper, lower and side edges of the end walls 17, the desk top subassembly is run through a suitable contact cement spraying machine to spray its end wall surfaces 29, and the sheets or strippings 26 are similarly treated to apply contact cement to their surfaces 46, after which the sheets or strippings 26 are centered on the respective bottom plate end marginal walls 17 and the resulting subassembly run through a suitable pressure roller arrangement to secure good bond between the strippings 26 and the bottom plate end marginal walls 17.

The top and bottom edges of the sheets or strippings 26 are then ground flush with the upper and lower and side edges of the end surfaces 28 of the top subassembly and side edges 47 are beveled, as by employing the indicated milling cutter, or the like. As seen in FIGS. 3 and 5, beveled edges 45 and 47 are in substantial abutting relation and mask the corners of the pan 14.

The resulting subassembly is then ready for application thereto of the top sheet 22, which, in accordance with this invention is proportioned to have a greater length and width than the length and width of the desk top subassembly to which it is to be applied.

The desk top subassembly and the sheet 22 are then separately run through a suitable contact cement spraying machine for application to the top surface 48 of the top

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plate 20 and the undersurface 50 of the top sheet 22 of suitable contact cement, and they are then passed through a suitable heating arrangement to drive off volatiles, after which the top sheet 22 is centered on the subassembly with its surface 50 in engagement with the top sheet surface 48, after which the assembled parts are run through a suitable pressure roller arrangement to secure a good bond between sheet 22 and plate 20.

In this connection, it is to be noted that the top sheet 22, in the embodiment of FIGS. 1-4, is to be bonded to the upwardly facing surfaces 32 and 33 of the respective inturned flanges 21 and 23, and consequently the contact cement should be applied to these surfaces as well as the portion of the undersurface 50 of the sheet 22 that is to contact same.

The overhanging edges of the top sheet 22 are then trimmed flush with the outwardly facing surfaces 52 and 54 of the respective strippings or sheets 24 and 26, by employing a suitable high speed milling cutter mechanism or the like. In this trimming operation the marginal edges of the sheet 22 are given a chamfer, as indicated at 58, which preferably is at an angle of between from about 20 to about 45 degrees with respect to the plane of the top, and overlies and masks the upper marginal edges of the respective sheets 24 and 26.

The completed top 10 is then available for use as a top for desks. The same top may also be employed as a table top, and if made narrower form, it can be used as a top for credenzas.

In the modification of FIG. 7, the embodiment of FIGS. 1-4 is varied to have the top plate 20A extend to the surfaces 28 and 29 of the respective marginal walls 16A and 17A, with the walls 16A and 17A being decreased in height to accommodate the corresponding change in level of positioning of the top plate 20A. The top finishing or laminating sheet 22A of this embodiment is thus substantially coextensive with top plate 20A; and, as in the embodiment of FIGS. 1-4, sheet 22A is formed to define beveled edge or chamfer 58 that overlies and masks the upper edges of the material covering surfaces 28 and 29. Alternately, as a cost saving simplification, top plate 20A may be eliminated and finishing sheet 22A bonded directly to the core 12A.

In the embodiment 10B of FIGS. 5 and 6, the marginal walls 16B and 17B of the bottom plate 14B each have affixed to their inside surfaces 60 and 61 a bead support member 62 (see FIG. 6) which includes a flange 64 that is disposed in spaced overlying relation relative to the respective inturned flanges 21 and 23. The top plate 20B is in the plane of the flanges 64 but is spaced somewhat therefrom by gap 42. The top finishing sheet 22B is adhered to top plate 20B and flanges 64, and has its marginal edges 65 ground flush with the end surfaces 66 of the flanges 64, while the top edges 68 of the strippings or sheets 24 and 26 are aligned with the top surfaces 32 and 33 of the respective inturned flanges 21 and 23, for application of a bead strip 70 that masks the edges 65 and 68. Walls 16B and 17B are of decreased height to accommodate the bead support member 62.

In the top 10C (see FIG. 8), the top plate 20C follows the form of FIG. 7 and overlies and is adhered to flanges 64, the form of FIG. 8 otherwise being the same as the embodiment of FIGS. 5 and 6. Similarly to the embodiment of FIG. 7, top plate 20C may be eliminated and finishing sheet 22C bonded directly to core 12C, as a cost saving simplification.

#### SPECIFIC DESCRIPTION

The core or filler 12 may be of the same type described in said Grube patent, and thus may be formed from kraft paper impregnated with a phenolic resin. It may be available for use in the desk tops herein described either in the single piece form shown in FIG. 2, or in the form of several segments placed side by side. As the type of filler core indicated is moisture and fire resistant, and is not subject

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to deterioration, it is preferred, but of course other types of cellular structures may be employed as deemed desirable or necessary. Core 12 is proportioned so that its margin 81 complements but is somewhat smaller than the configuration defined by inturned flanges 21 and 23 so that the core 12 may be readily placed within the space 40. This leaves a void 83 between the margin of the core 12 and margin walls 16 and 17 of plate 14 that needs no attention, in accordance with this invention. The other embodiments 10A, 10B and 10C are similar in this regard, mounting members 62 being mounted in this void in tops 10B and 10C.

The top and bottom plates are preferably formed from 22 gauge steel. The bottom plate or pan 14 has its corners 80 suitably mitered as at 82, and is preferably formed with suitable holes 84 and 86 at its ends to provide convenient means for hanging the sheet to dry after it has been painted. Sheet 14 is also preferably formed with a plurality of holes 88 arranged in accordance with FIGS. 13 or 14 of Abrahamson Pat. 3,125,387 for application thereto of the C-channels disclosed in that patent for attaching the top to desk pedestals.

Top plate 20 is formed with a pair of holes 90 at either end thereof to conveniently support the plate 20 when painted for drying.

As indicated, all surfaces of the top and bottom plates are suitably painted (as by spray painting or the like) to insure good bond contact with contact cement. However, painting is not considered an essential, but the metal surfaces must be free from dust, rust, oil and the like that would detract from good bond contact with contact cement.

The sheets or strippings 24 and 26 and the top sheet 22 may be formed from any substance suitable for covering the exposed surfaces of the bottom and top sheets and that is decorative and wear resistant. A suitable high pressure melamine laminate, will be satisfactory (Textolite is a trademark for plastic laminates made and sold by the Laminated Products Department of General Electric Company, see 1968 edition of Modern Plastics Encyclopedia at p. 1230).

At the corners 80 of the bottom plate 14, the rim walls 16 and inturned flanges 21 are fixed together by spot welding an angle member 92 therebetween, as and where indicated at 94 and 96 (see FIGS. 3 and 4). The bottom plates of the other embodiments are similarly equipped, the bead supports 62 being relieved at their ends as necessary to accommodate the angle members 92 in tops 10B and 10C, and their flanges 64 being mitered at adjacent corners (see FIG. 5).

In the embodiment 10 of FIGS. 1-4, the bottom plate 14 has affixed thereto about its marginal edges a decorative device 97 comprising J-strip 98 that presents a planar surface 100 just below and spaced from the respective strippings or sheets 24 and 26. This presents a novel decorative effect suggesting that the top floats above its supports. The strips 98, which are coextensive with respective marginal walls 16 and 17 and are mitered at the corners 80, are secured in place by suitable screws 102. Device 97 is equally applicable to the other embodiments of the invention.

In the top 10B of FIGS. 5 and 6, the support member 62 that is affixed to the bottom plate marginal walls 16 and 17 is generally of U-shaped cross-sectional configuration defining a wing flange 110 that is affixed to the bottom plate marginal wall 16 at spaced points therealong as at 112, an inwardly extending wall 114 connecting with a back wall 116 which in turn connects with top wall 118 that forms the flange 64. As indicated, there is a member 62 for each marginal wall 16 and 17 and extending substantially coextensive therewith, with suitable mitering and angle members 92 at corners 80.

The respective strip members 70 each comprise a strip 120 formed from suitable sheet metal and appropriately plated and formed to define the convexly rounded edge

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122 having a rectilinear terminus 124, with the other edge 126 of the strip 120 being substantially planar and proportioned for a friction fit between the flange 64 and the respective inturned flanges 21 and 23 of the respective marginal walls 16 and 17.

The strip 120 is applied to each marginal wall 16 as the last procedure in completing the tops 10B and 10C.

The contact cement employed in practicing this invention may be of any suitable standard type of contact cement. There is thus provided a top arrangement of general application that has a high strength to weight ratio, that is economical of manufacture, and aesthetically pleasing in appearance.

The foregoing description and the drawings are given merely to explain and illustrate the invention and the invention is not to be limited thereto, except insofar as the appended claims are so limited, since those skilled in the art who have the disclosure before them will be able to make modifications and variations therein without departing from the scope of the invention.

I claim:

1. A desk top comprising:

a lower sheet metal substantially planar pan of generally quadrilateral configuration defining upstanding marginal side and end walls about its rim each including a planar outwardly facing surface and an inturned flange disposed in the plane of the pan with said flanges being, in coplanar relation, and with the inner margins of said flanges defining an opening forming an open top for said pan,

said surfaces being of generally quadrilateral configuration and said side and end walls forming right angle corners for the pan,

a cellular filler structure bonded to said pan within and spaced from said walls and having a marginal configuration substantially complementing that of said opening,

with the space between said filler structure and said pan marginal walls being a void about the margin of said filler structure,

a layer of desk top finishing material on top of and made fast to said filler structure in substantial parallelism to the plane of said pan and extending over said flanges to present side edges in substantial alignment with the respective pan marginal walls and corners,

said layer covering said filler structure and said flanges, and a layer of finishing material bonded to and overlying each of the respective outwardly facing surfaces of the respective pan marginal walls with each layer of finishing material defining an upper marginal edge adjacent the plane of said flanges,

said layers of the respective side and end marginal walls at the respective pan corners terminating in beveled edges that overlie the respective pan corners and are in substantial abutting relation to mask the respective pan corners,

and means for masking said upper marginal edges of the respective finishing material layers of said walls.

2. The desk top set forth in claim 1 wherein:

said means for masking said upper marginal edges of the respective finishing layers of said walls comprises:

said side edges of said desk top finishing material layer overlying and abutting said upper marginal edges of said respective wall layers, said marginal edges of said desk top finishing material layer being beveled.

3. The desk top set forth in claim 1 wherein:

said means for masking said upper marginal edges of the respective finishing layers of said walls comprises:

a bead strip extending the length of each marginal wall and applied thereto between the respective said upper marginal edges of said marginal wall

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finishing material layers and said desk top finishing material layer side edges.

4. The desk top set forth in claim 1 including:  
an upper planar metal sheet interposed between said  
filler structure and said desk top finishing material 5  
layer and bonded thereto,  
said upper metal sheet covering said filler structure.
5. The desk top set forth in claim 4 wherein:  
said upper metal sheet is proportioned to fit within  
said inturned flanges and is in coplanar relation there- 10  
with,  
said top finishing material layer being bonded to the  
upwardly facing surfaces of said flanges and said  
upper sheet.
6. The desk top set forth in claim 4 wherein: 15  
said upper metal sheet is proportioned to engage the  
upwardly facing surfaces of said flanges and extend  
to said rim of said pan,  
said upper sheet being bonded to said flange surfaces  
and said filler structure in parallelism with the plane 20  
of said pan and said top finishing material overlying  
and masking said upper sheet.
7. The desk top set forth in claim 1 including:  
an angle element at each corner thereof affixed between 25  
the respective marginal walls at such corner and the  
adjacent portions of said inturned flanges.
8. The desk top set forth in claim 4 including:  
a bead strip extending the length of each marginal  
wall and applied along the respective side edges of  
said top finishing material and comprising said mask- 30  
ing means,  
a bead support member anchored to each of said walls  
and including a flange overlying said inturned flange  
thereof,  
said support member flanges being in coplanar relation, 35  
said bead strips each including a strip portion fric-  
tionally received between the respective support mem-

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ber flanges and the inturned flange underlying same,  
with said upper marginal edges of the respective mar-  
ginal wall layers abutting the bead strip overlying  
same and said bead strips masking said side edges of  
said top layer of finishing material.

9. The desk top set forth in claim 8 wherein:  
said upper metal sheet is proportioned to fit within  
said support member flanges and is in coplanar rela-  
tion thereto,  
said top finishing material being bonded to the up-  
wardly facing surfaces of said support member  
flanges.
10. The desk top set forth in claim 8 wherein:  
said upper metal sheet is proportioned to engage the  
upwardly facing surfaces of said support member  
flanges and extend substantially to said rim of said  
pan,  
said upper sheet being bonded to said support member  
flange surfaces and said top finishing overlying said  
upper sheet.

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PHILIP DIER, Primary Examiner

U.S. Cl. X.R.

62—619, 623; 108—161; 161—68

UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,676,279 Dated July 11, 1972

Inventor(s) D. V. BEAVER

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

IN THE DRAWINGS: THE FILING DATE IS INDICATED AS "JUNE 10, 1970" IT SHOULD BE -- JUNE 16, 1970 --.

Signed and sealed this 23rd day of January 1973.

(SEAL)  
Attest:

EDWARD M. FLETCHER, JR.  
Attesting Officer

ROBERT GOTTSCHALK  
Commissioner of Patents

UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,676,279 Dated July 11, 1972

Inventor(s) D. V. BEAVER

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

IN THE DRAWINGS: The Filing Date is indicated as "June 10, 1970" it should be -- June 16, 1970 --.

Signed and sealed this 15th day of May 1973.

(SEAL)  
Attest:

EDWARD M. FLETCHER, JR.  
Attesting Officer

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Commissioner of Patents