Nov. 18, 1941. I. WALDVOGEL 2,263,545

HOLLOW BODY AND PROCESS OF PRODUCING SAME

Filed Dec. 24, 1937 2 Sheets-Sheet 1

Fig. 1.

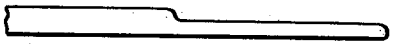


Fig. 2.

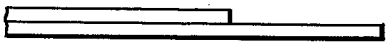


Fig. 4.

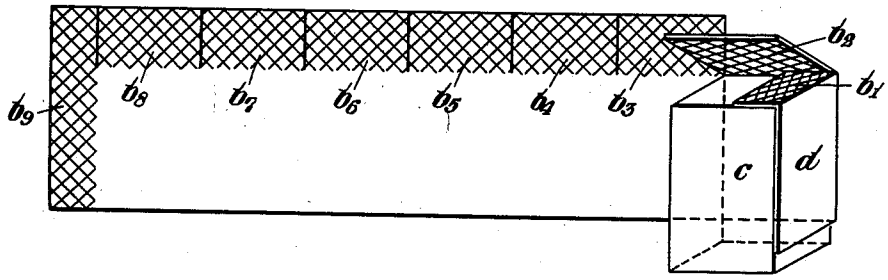


Fig. 3.

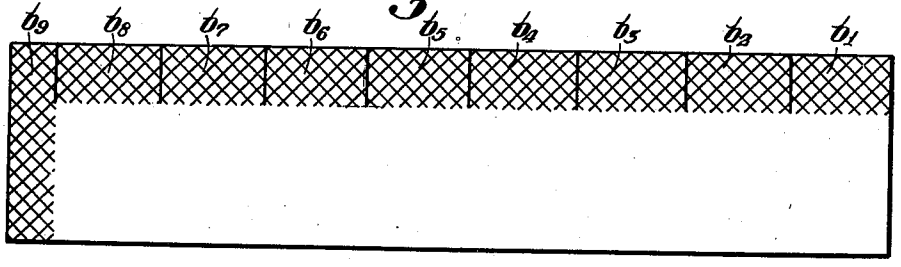


Fig. 5.

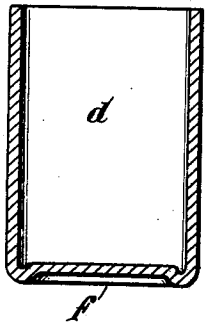
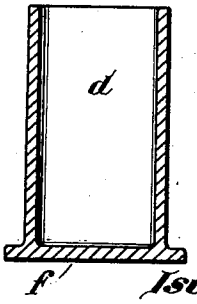


Fig. 6.



Inventor:
Isidor Waldvogel,
by Richards & Geier
Attorneys.

Nov. 18, 1941. I. WALDVOGEL 2,263,545

HOLLOW BODY AND PROCESS OF PRODUCING SAME

Filed Dec. 24, 1937 2 Sheets-Sheet 2

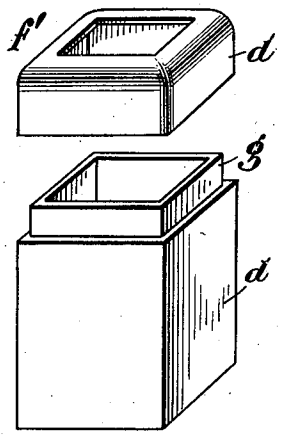


Fig. 7.

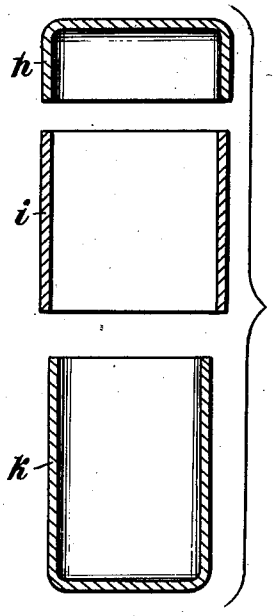


Fig. 8.

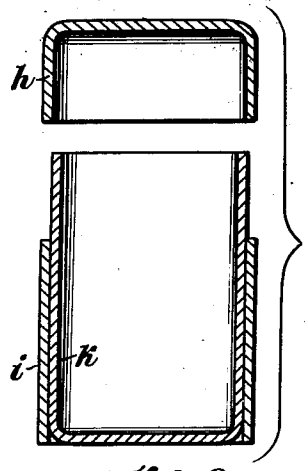


Fig. 9.

Fig. 10.

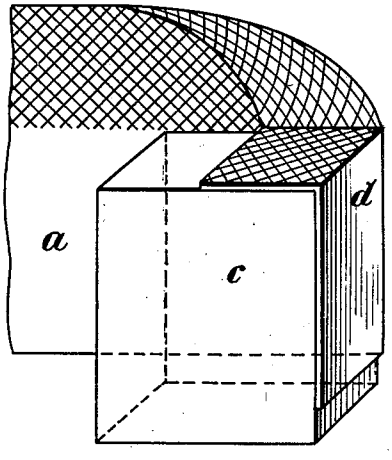
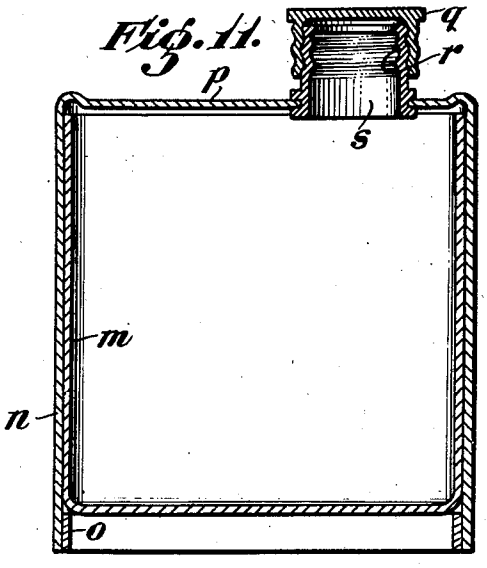


Fig. 11.



Inventor:
Isidor Waldvogel,
by Richards & Geier
Attorneys.

Patented Nov. 18, 1941 2,263,545

UNITED STATES PATENT OFFICE

2,263,545

HOLLOW BODY AND PROCESS OF PRODUCING SAME

Isidor Waldvogel, Susice, Czechoslovakia

Application December 24, 1937, Serial No. 181,512

6 Claims. (Cl. 93—36.8)

This invention relates to hollow bodies closed at one side by a bottom, manufactured from paper or cardboard or a similar material, and being of triangular, rectangular or polygonal section, such as e. g. boxes, covers, cases, containers and the like, the sidewalls being formed by folding a blank or sheet or strip of paper on a mandrel of suitable cross section.

The object of the present invention is an improvement of such hollow bodies closed at the one side, and furthermore of the processes of producing such bodies, said improvement consisting in that the blank, or sheet, or strip whereof the hollow body will be formed, is constituted by a sheet, the surface of which, in the case of the shell being formed by a single layer, is larger than the developed surface of the hollow body and in the case of the shell being composed of more than one layer, the surface is larger than the corresponding multiple of said surface, the paper rim extending over the front of the moulding mandrel and forming the bottom after having been folded and pressed together, being reduced in thickness relatively to the remaining portion of the paper sheet or strip or blank. Such reduction in thickness may be produced e. g. by shaving off or in the case of multilayer paper by reducing the number of the paper layers.

Preferably the blank for producing the hollow body therefrom will be in the form of a rectangle, the base of which will approximately correspond to the circumference of the hollow body and in the case of a multilayer shell approximately to the corresponding multiple of such circumference, whilst its height will be greater than that of the hollow body. The rim portion of the paper strip corresponding to such difference in height and forming the bottom of the body to be produced, is reduced in thickness relatively to the remaining portion of the paper and may be divided into tongues by means of edgewise extending notches, said tongues being thereupon individually, each after the formation of the respective sidewall of the hollow body, pressed onto the frontal surface of the mandrel, the bottom being thus formed of a greater number of layers than the sidewalls of the hollow body, the above mentioned reduction in thickness of the rim avoiding, however, an excessive thickness of the bottom produced. Since the sheet wherefrom the bottom is produced, or at least the rim portion thereof, will be wetted out with an adhesive material, the individual layers of the bottom will be firmly united to a whole by the pressing process onto said mandrel.

A characteristic feature of the object of the present invention is the bottom constituted by a greater number of layers than the shell, the layers wherefrom the bottom is formed being of a weaker paper than those of the shell and that the bottom passes seamlessly over to the shell. Since the paper rim is reduced in its thickness, the greatest part of its tension is eliminated thereby, so that its resistance against folding and pressing when moulding the bottom is greatly reduced. The paper thus moulded loses, thanks to its reduction in thickness, the greatest part of its tendency to return into the original position by influence of its proper elasticity.

In comparison of the hitherto known angular hollow bodies, the object of the present invention offers the following advantages:

In the usual quadrangular or polyangular cases, the utilised plain blank corresponds approximately to the developed surface of the box. The complicated shape of such blanks increases greatly the production costs owing to the considerable waste. The hollow bodies according to the invention may be produced from blanks of a much simpler shape, mostly from a rectangle with weakened rim. Such rectangles and simple blanks may be cut from a band, so that the material for the blanks may be fed from the bobbins both in the case of manual and mechanical production. From said bobbin band the machine may cut off and shave the blanks, cut the notches and fold the paper in one operation.

This simplification of the production allowed according to the present invention enables also a substantially higher degree of compactness in use of the cases and containers produced than is the case when using the well-known quadrangular or polygonal cases, the folding of which results always in the formation of a certain number of seams, which thereupon are closed by filling with adhesive material, stitching etc. but always lead to the possibility of leakage.

In the case of improved design according to the present invention, each individual layer of the bottom will be united seamlessly with the sidewall of the case, so that the whole bottom is connected to the whole shell without any joint, the shell itself showing only a single lengthwise seam, which seam, however, in the nearly exclusively used multilayer design of the shell, will be entirely covered. The cases improved according to the present invention are also very suitable for containing pulverised or liquid goods, which was impossible to realize hitherto in the quadrangular cases of known designs. Quadrangular

cases, however, represent in comparison with the round cases the advantage that they occupy substantially smaller space at an equal total capacity.

Another important feature of the invention consists in that, thanks to the reduction of the paper rim in thickness, the bottom, in spite of being of multilayer design, may not be substantially, or at all, thicker than the shell, which feature is very important for the quality of the hollow body produced for various technical applications. Furthermore such a bottom, formed of many thin layers, can be subsequently easily remoulded by repeated pressing, profiling and provided with a stamping.

In consequence of all the above mentioned features the hollow bodies produced according to the present invention may be used for the most various purposes, e. g. as boxes, cases, covers, tubes, envelopes, handles, especially for tools, cases for writing appliances, playing-cards etc.

The bottom of the cases may be flat or of any other convenient shape corresponding either to the front face of the mandrel or resulting from a subsequent pressing operation.

Other objects of the invention will be apparent from the detailed description hereinafter, with reference to the accompanying drawings, forming a part thereof and showing, by way of example, preferable embodiments of the present invention, in a diagrammatical manner, and wherein like characters of reference refer to similar parts in the several figures.

Fig. 1 shows, at an enlarged scale, the reduction of the thickness of the paper, that is cardboard rim, produced by shaving off or the like.

Fig. 2 illustrates the reduction of the thickness of the rim attained by lessening the number of paper layers when using multilayer paper.

Fig. 3 shows a blank for a hollow body to be produced, of a rectangular cross-section.

Fig. 4 shows the forming of the hollow body from such blank.

Figs. 5 and 6 show the hollow bodies ready for use, after finishing in a press, in longitudinal section.

Fig. 7 shows a quadrangular case, with inserted neck-edging together with a suitable cover.

Figs. 8 and 9 illustrate a modified form of a case with edging, in accordance with the present invention.

Fig. 10 shows the moulding operation of a hollow body of rectangular cross-section, the rim whereof is not provided with slits.

Fig. 11 shows, in longitudinal section, an oil-canister produced of two hollow bodies designed according to the present invention.

In the drawings, the portions of the paper reduced in thickness are indicated by crosswise hatching. For the sake of clearness, the thickness of the paper, that is cardboard is shown somewhat greater than will be normally used.

Preferably a rectangular blank as shown in Fig. 3 may be used. In the embodiment illustrated the blank for a hollow body is utilized for the production of a two-layer shell according to Fig. 4. The strip *a* which may be cut from a bobbin, is higher than the case itself. The rim portion corresponding to the difference in height is, as can be seen in the hatched portion of the drawings, of reduced thickness and divided, by the slits extending in edgewise directions, into 8 tongues b_1–b_8, of a width equalling the width of the adjacent sidewall. The tongue b_9 serves for forming an overlapping closure seam the rim whereof may equally be reduced in thickness. The whole sheet is wetted out with an adhesive material.

For producing a quadrangular hollow body, the sheet will be folded, as is shown in Fig. 4, on a mandrel *c*, the unweakened portion of the sheet *a* forming the sidewalls *d*, whilst the tongues b_1–b_9 side-by-side, after the adjacent side-wall portion has been formed, are folded and pressed towards the frontal face of the mandrel, whereby the individual layers of the bottom are firmly attached by means of the adhesive.

The finished case has, with the exception of the longitudinal seam of the shell, no other seam. However said seam is wholly covered by the inner layer of the shell. In the embodiment shown in Fig. 5 the bottom will be provided by subsequent pressing with an annular bead.

By chosing a suitable tool for the subsequent pressing operation on the bottom, the bottom may be provided with an extending rim shown in Fig. 6.

Fig. 7 shows a hollow body which may be used as a case having an inserted neck-edging *g* for the cover. The cover will be manufactured in the same manner as the case, the cover *f'* being provided with a stamping produced by a subsequent pressing operation.

The case and cover according to Figs. 8 and 9 are produced of two hollow bodies designed according to the present invention, the inside circumferential dimensions of the one body corresponding to the outside circumferential dimensions of the other body. The hollow body of the greater cross-section will be cut into two portions *h* and *i*, as is shown in Fig. 9. The closed portion *h* constitutes the cover, the remaining portion *i*, open at both sides, is thereupon slid over the other hollow body *k* and connected therewith, so that the projecting portion of the inner body *k* forms the neck-edging for the cover *h*. In comparison with the embodiment shown in Fig. 7 this design enables a more simple manufacture.

For the production of the above described hollow bodies rectangular blanks may equally be utilized, the rim of which is not divided into tongues (Fig. 10).

As is shown in Fig. 11 it is also possible, according to the invention, to manufacture completely closed containers, for instance, the oil-canister illustrated. This is realized by inserting two prismatic containers *m*, *n* manufactured according to the invention, into one another with their openings facing each other, the outside dimensions of the inner container *m* corresponding exactly to the inside dimensions of the outer container *n*. The containers *m*, *n* are connected together by adhesive and secured by a ring *o*. Within the wall *p* an opening *s* is provided for inserting e. g. a neck-tube *r* of any suitable material, which neck may be closed by a cover *q*.

The hollow body produced according to the present invention may have any convenient shape, e. g. of a prism, truncated pyramid, with sharp or rounded edges.

The compactness and durability of the hollow bodies serving as containers may be further increased by any suitable impregnation. The outside finish of the hollow bodies in accordance with the invention may be modified by any suitable paint, printing, etc.

I do not desire to limit myself to the precise form and construction shown in the drawings, as it is obvious, that many changes of details, e. g. relative to the number of edges, to the shape and cross-section of the hollow bodies to be produced

and to the form of bottom and blanks may be made and the hollow bodies produced may be used for other purposes than indicated, without departing from the spirit of the invention as defined in the appended claims.

Having thus described my said invention, I declare that what I claim is:

1. A process of producing a hollow tubular body of polygonal cross-section closed at one end, which comprises the steps of reducing the thickness of an edge portion of fibrous strip material relatively to the remainder thereof, coating said material with moist adhesive, folding said edge portion relatively to the remainder of the material about a mandril while placing at least one part of said edge portion over another part of said edge portion, and compressing the overlapping parts of said edge portion to unite them with said adhesive and to form the bottom of said hollow tubular body.

2. A process of producing a hollow tubular body of polygonal cross-section closed at one end, which comprises the steps of reducing the thickness of an edge portion of fibrous strip material relatively to the remainder thereof, coating said material with moist adhesive, providing slits in said edge portion to separate it into a plurality of parts, folding said edge portion relatively to the remainder of the material about a mandril while causing said parts to overlap, and compressing the overlapping parts of said edge portion to unite them with said adhesive and to form the bottom of said hollow tubular body.

3. A process of producing a hollow tubular body of polygonal cross-section closed at one end, which comprises the steps of reducing the thickness of an edge portion of fibrous strip material relatively to the remainder thereof, coating said material with moist adhesive, providing slits in said edge portion to separate it into a plurality of parts, folding said edge portion relatively to the remainder of the material about a mandril while causing said parts to overlap, compressing the overlapping parts of said edge portion to unite them with said adhesive and to form the bottom of said hollow tubular body, and further compressing said bottom to shape the same.

4. As an article of manufacture, a hollow tubular body of polygonal cross-section having side walls enclosing an opening and a bottom, and consisting of fibrous strip material impregnated with an adhesive, said side walls consisting of at least one layer of said material, said bottom consisting of a plurality of overlapping layers of said material interconnected by the adhesive, each side wall layer being integral with a separate overlapping bottom layer and being thicker than the latter.

5. A process of producing a hollow closed tubular body of polygonal cross-section, which comprises the steps of reducing the thickness of edge portions of two separate strips of fibrous material relatively to the remainder thereof, coating said material with moist adhesive, providing slits in said edge portions to separate them into a plurality of parts, folding separately said edge portions relatively to the remainder of the material about a mandril while causing the parts of each strip to overlap to form two body members tightly fitting one into the other, separately compressing the overlapping parts of each body member to unite the overlapping parts with said adhesive and to form the bottom and the top of said closed tubular body.

6. A process of producing a hollow tubular body of polygonal cross-section, which comprises the steps of coating two separate strips of fibrous material with an adhesive, reducing the thickness of an edge portion of at least one of said strips relatively to the remainder thereof, folding the two strips separately about a mandril to form two body members tightly fitting one into the other while folding said edge portion relatively to the remainder of the material and placing a part of said edge portion over another part of the same edge portion, compressing the overlapping parts of said edge portion to unite them with said adhesive and to form the bottom of said hollow tubular body, fitting one body member into the other body member and interconnecting the two body members by said adhesive.

ISIDOR WALDVOGEL.