My Invention relates to new and improved method and apparatus for producing covered articles, or for applying a covering of thin sheet material to a base or body, as for example in producing pen-stands or any other of a wide variety of articles.

The base or body to be covered may be of almost any material, such as metal, ceramic, etc., and may have varying surface forms or contours, including incurred or undercut portions; and it is desired to apply a covering of thin sheet material such as celluloid, in order to produce a complete article of decorative appearance and at a low cost.

A principal object is to provide a novel method and means for ensuring the close, uniform and permanent application of the cover-sheet.

To these ends I provide, in effect, a pressure chamber, in which the body is placed, with the cover sheet in flexible, moldable, or plastic condition located thereupon, and apply pneumatic pressure in such manner as to withdraw or expel air from below the cover sheet and press, stretch and form the sheet closely upon and about the body surface.

The characteristics and advantages of the invention are further sufficiently explained in connection with the following detail description of the accompanying drawings, which shows one representative embodiment. After considering this example, skilled persons will understand that many variations may be made without departing from the principles disclosed, and I contemplate the employment of any structures or methods that are properly within the scope of the appended claims.

In the drawing:

Fig. I is a side elevation of apparatus embodying the invention structure in one form.

Fig. II is a detail, in vertical section.

Fig. III is a fragmentary plan view of the plate forming a part of the invention.

Fig. IV is a side elevation of same.

The invention will be well understood from a description of it as adapted for production of such articles as fountain-pen holders, or "stands" such as I, Figs. III and IV, although it is obvious that there is no particular limitation as to the nature of purpose of the article produced. Such an article as illustrated includes a base or body 2 (Fig. II) of any suitable material, and it is desired to apply to the upper surface of the body a covering 3 of relatively thin sheet material, such as celluloid, to protect or partially or entirely conceal the body, produce various decorative effects, etc. In many cases it is desirable that the margin of the covering shall underlap the periphery of the body, as at 4.

The body surface to be covered may be more or less irregular, including for example depressed, incurred, or "undercut" formations such as 2a, Fig. II, and it has been heretofore difficult or impossible by any known means to properly cover such articles with sheet material analogous to celluloid, on account of the obvious manipulative difficulties involved.

A plate or table 5, Figs. I and II, has a portion to receive body 2, a peripheral channel or depression 6, and therewith, a plurality of holes or ports 7 passing through the plate, and connected by cross-channels 8 at the upper surface. Below the plate is a suction bowl or chamber 9 connected by a pipe 10 and valve 11 to any suitable exhuster 12, or tank from which air is exhausted. At the top of the plate is a pressure bowl or housing 13 movably connected in any suitable way, as by a hinge 14 and swing-clamp 15. This housing is connected by a flexible pipe 16, and valve 17, to a pump 18 or tank containing air under pressure. There is a suitable seal for the housing, such as a gasketed channel 19 in the plate, in which the rim of the housing engages.

With the housing 13 raised (see dotted lines, Fig. I) the base or body 2 is placed on plate 5 with its margins overlapping a portion of channel 6. The cover-sheet 3, dimensioned to overlapp channel 6, as also shown in Fig. I, is then placed over the body. The cover sheet is rendered more or less plastic, as by heating, treatment with acetone, etc.

A suitable cement is applied to the under sheet surface or to the body surface. In the case of celluloid, if softened by acetone, other cement may sometimes be dispensed with. Since such material as sheet celluloid is often porous, on account of small pin holes, etc., another sheet 30, of rubber or other suitable flexible and impervious material, is usually placed over the cover sheet. This sheet 30 is conveniently identified as a "blanket", or "moldings" or "pressing sheet", since it not only serves to prevent air leakage through a porous cover sheet, but materially protects the latter from disruptive strains, etc., during the stretching and shaping operation as will appear.

Housing 13 is then moved to "closed" position, and secured, as shown in full lines, and valves
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11 and 17 are opened, whereupon air is first withdrawn into chamber 9 through holes 7, and pressure is then applied in housing 3 to the superficial surface of the cover or blanket sheet, thus exhausting air from between the adjacent faces of sheet 3 and body 2, and from channel 6, and causing the sheet margin 5 to be drawn down into the channel, as shown in Fig. II, stretching the sheet tightly over and upon the upper surface of the body and about its periphery, and under the peripheral margin, as at 4. A shoulder at the inner upper edge of the channel 6 limits the width of the marginal formation.

When a protecting, or blanket sheet such as 30 is used, it directly takes the pressure applied in chamber 13 and applies it to the underlying cover sheet, acting as an impervious seal to prevent air leakage through any porosities of the cover sheet for lodgment between it and the body surface. The blanket also aids in molding or pressing the cover into irregularities, depressions or "undercuts" of the body, to a great extent relieving the cover sheet of localized strains, and tending to prevent undue stretching or breaking of the cover sheet.

It will be noted that in a preferred mode of operation, while the cover sheet still rests more or less loosely upon the body, low pressure is first produced in chamber 9, thus drawing air, as gradually or rapidly as may be desired, from below the cover sheet and from between the sheet and the body surface, and exhausting air from the "hollow" spaces of the latter, in order to permit the sheet to be then drawn and forced down in close uniform contact with the body surface throughout, and without entrapped air which would produce a "blister" effect in the finished article; pressure is then, or more-or-less concurrently, applied in the upper chamber, to mold or force the cover sheet, under any required degree of pressure, into contact with the body.

The cover sheet, if in plastic condition, quickly hardens or sets and more-or-less "setting" may be permitted before the article is removed; the housing 13 is "opened", the article removed, the protective sheet removed, and the surplus margin of the cover sheet trimmed off, producing the article of Fig. III, in which the body is closely and uniformly covered by the cover sheet, without entrapped air bubbles, and adherently retained by the adhesive. If desired the article may be mounted on another body, or sub-base 20, Fig. IV, whereby the cover margin underlying the body is concealed.

I claim:

1. A method of producing a covered article made up of a body and a sheet of relatively thin cover material overlying one face of the body, its peripheral edge, and underlying its undermargin, comprising applying the sheet to a surface of the body and applying pneumatic pressure to press and permanently fasten the sheet upon the body surface and form sheet marginal edges in underlying engagement with the undermargin of the body.

2. A method of producing a covered article, comprising a body and a sheet of relatively thin cover material overlying one face of the body, its peripheral edge, and underlying its undermargin, the method comprising applying the sheet to a surface of the body and applying pneumatic pressure effects to move air from between the sheet and body, stretch the sheet upon the body surface and form sheet margins in underlying engagement with the undermargin of the body.

3. A method of producing a covered article, made up of a body, and a sheet of relatively thin cover material overlying one face of the body, its peripheral edge, and underlying its undermargin, comprising applying the sheet to a surface of the body and applying pneumatic effects to remove air from between the sheet and body, stretch the sheet upon the body surface and form sheet margins in underlying engagement with the undermargin of the body, and trimming off superficial sheet marginal portions.

4. Apparatus for purposes described, comprising a plate having a channel in its surface and said plate having perforations therethrough, and having cross-channels connecting said perforations with the channel first named.

5. A process of claim 2, with the addition that a separate protective sheet is placed over the cover sheet before the pressure treatment.

6. Apparatus for applying a sheet of cover material to a body, and forming marginal edges in underlying engagement with the undermargins of the body, said apparatus comprising a plate provided with a recessed channel in the surface thereof and with perforations through the plate, and means enclosing the channeled and perforated area of the plate to form a pneumatic chamber.

7. Apparatus for applying a sheet of cover material to a body, and forming marginal edges in underlying engagement with the undermargins of the body, said apparatus comprising a plate provided with a recessed channel in the surface thereof and with perforations through the plate, and means enclosing the channeled and perforated area of the plate to form a pneumatic chamber, and means for providing pneumatic pressure effects in the chamber.

8. Apparatus for applying a sheet of cover material to a body, and forming marginal edges in underlying engagement with the undermargins of the body, said apparatus comprising a plate provided with a recessed channel in the surface thereof and with perforations through the plate, and means enclosing the channeled and perforated area of the plate to form a pneumatic chamber, and means for controlling applying positive pressure in an upper portion of the chamber and negative pressure in a lower portion thereof.

9. Apparatus for applying a sheet of cover material to a body, and forming marginal edges in underlying engagement with the undermargins of the body, said apparatus comprising a plate provided with a recessed channel in the surface thereof and with perforations through the plate, and means enclosing the channeled and perforated area of the plate to form a pneumatic chamber, and means for controlling applying positive pressure in an upper portion of the chamber and negative pressure in a lower portion thereof, one portion of the chamber being movable, to permit emplacement of a body and a sheet of cover material.

10. Apparatus for applying a sheet of cover material to a body, and forming marginal edges in underlying engagement with the undermargins of the body, said apparatus comprising a plate provided with a recessed channel in the surface thereof and with perforations through the plate, and means enclosing the channeled and perforated area of the plate to form a pneumatic chamber, said recessed channel being dimensioned.
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and arranged to underlie the peripheral margin of a body and a sheet of cover material placed on the plate.

11. Apparatus for applying a sheet of cover material to a body, and forming marginal edges in underlying engagement with the undermargins of the body, said apparatus comprising a plate provided with a recessed channel and with perforations through the plate, and means enclosing the channeled and perforated area of the plate to form a pneumatic chamber, said recessed channel and said perforations being connected by cross-channels.

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