United States Patent [19]

Scantlebury

[11] **3,745,970**

[45] **July 17, 1973**

[54] **APPARATUS FOR APPLYING A PATTERN TO AN ARTICLE**

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[73] Assignee: **Erie Universal Products Company**, Erie, Pa.

[22] Filed: **Jan. 7, 1971**

[21] Appl. No.: **104,706**

[52] **U.S. Cl.** **118/50,** 118/211, 101/41

[51] **Int. Cl.** **B05c 1/02**

[58] **Field of Search** 101/41, 37; 118/50, 118/263, 243, 200, 211

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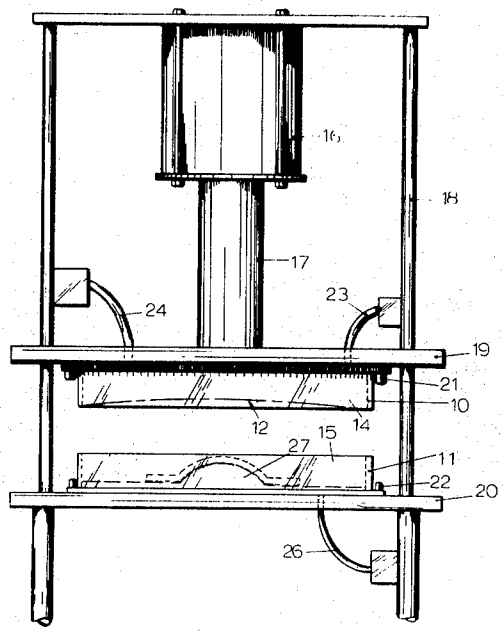
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Primary Examiner—John P. McIntosh
Attorney—Charles L. Lovercheck

[57] **ABSTRACT**

This specification discloses a coating process for articles of manufacture which uses an open hollow head and a diaphragm stretched across the opening. The diaphragm has embossed on it the pattern which is to be coated on the article. Air pressure forces the diaphragm into engagement with a coating plate. The diaphragm is then drawn up into the head. The coating plate is removed and replaced by the article to be coated. Air pressure forces the diaphragm into engagement with the article thereby coating the pattern on the article.

2 Claims, 11 Drawing Figures



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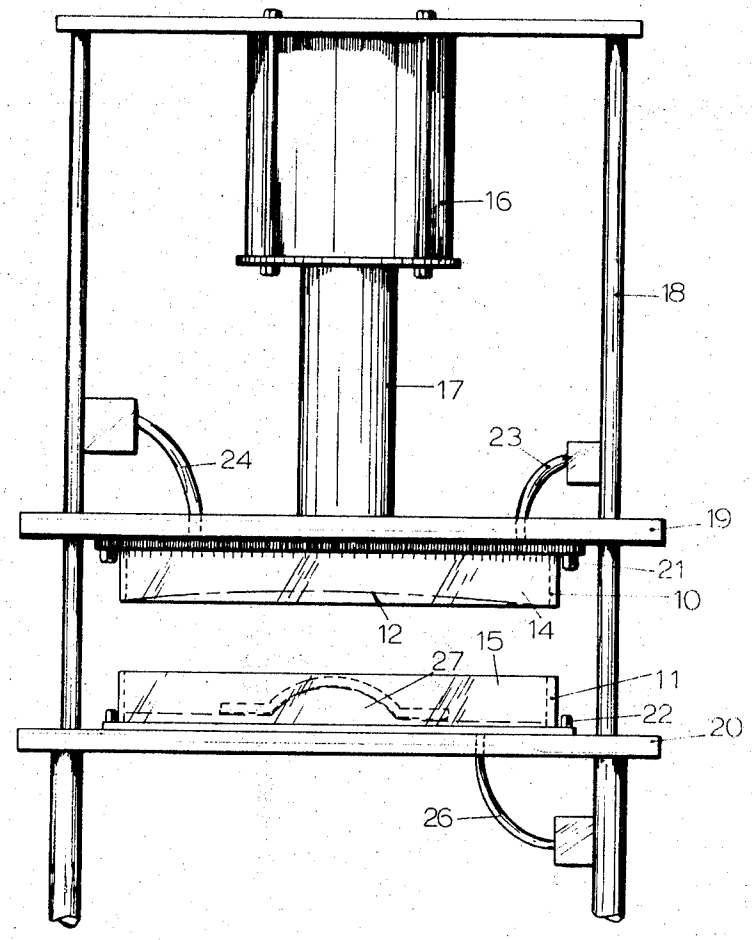


FIG. 1

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Attorney

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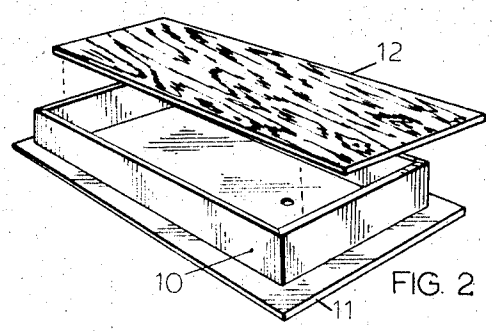


FIG. 2

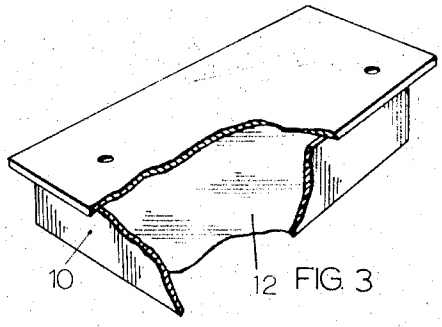


FIG. 3

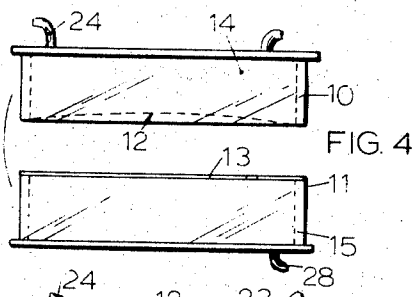


FIG. 4

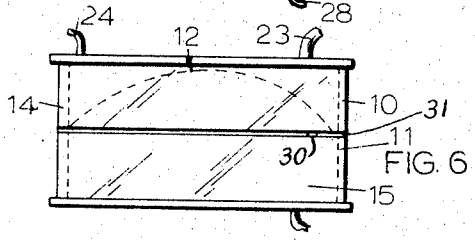


FIG. 6

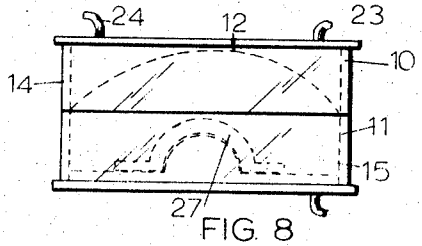


FIG. 8

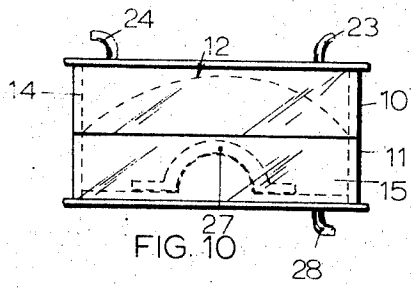


FIG. 10

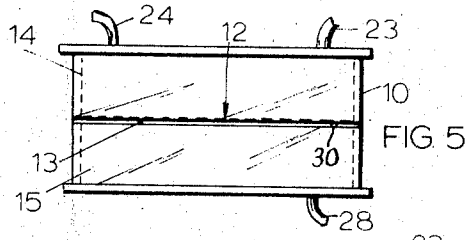


FIG. 5

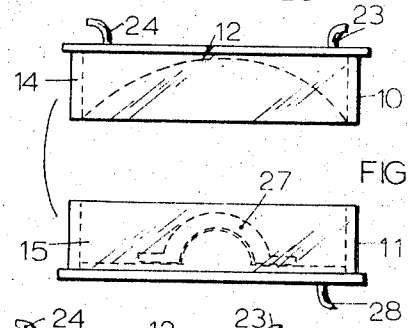


FIG. 7

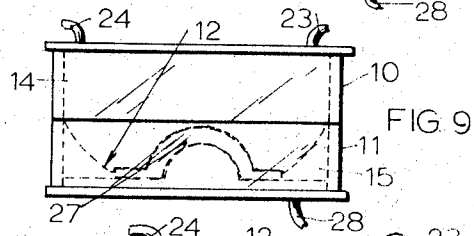


FIG. 9

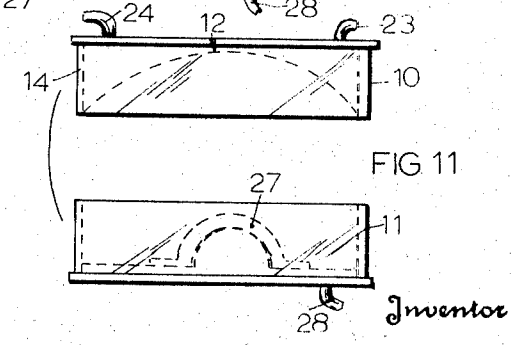


FIG. 11

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APPARATUS FOR APPLYING A PATTERN TO AN ARTICLE

STATEMENT OF INVENTION

This invention relates to finishing machines and, more particularly, to machines for finishing plastic materials. Various printing means have been provided but none have been provided whereby a pattern can be transferred readily to an irregular or curved surface successfully.

OBJECTS OF THE INVENTION

It is an object of the invention to provide an improved coating apparatus.

Another object of the invention is to provide coating or printing equipment which is economical, simple, and efficient to use.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a front view of the machine according to the invention.

FIG. **2** is an exploded view showing the upper box inverted with a diaphragm above it showing the pattern on the diaphragm.

FIG. **3** is a view showing the upper box and rubber diaphragm in place for use.

FIG. **4** is an exploded view showing the top box above the bottom box.

FIG. **5** is a view showing the top box supported on the bottom box.

FIG. **6** is a view showing the top box on the bottom box with the diaphragm drawn up into the top box.

FIG. **7** shows an exploded view with the top box spaced from the bottom box and the article in printing position.

FIG. **8** shows the top box supported on the bottom box with an article to be printed shown and the diaphragm drawn up into the top box.

FIG. **9** shows the top box supported on the bottom box with the pattern in place and the diaphragm forced out into engagement with the pattern.

FIG. **10** shows the top box supported on the bottom box with the diaphragm drawn up away from the pattern.

FIG. **11** shows the top box separated from the bottom box and the diaphragm drawn back into the top box away from the article ready to be removed from the bottom box.

GENERAL DESCRIPTION OF THE INVENTION

There are many different processes for printing flat surfaces of paper, metal, plastic, glass, etc. Also, tubular and conical surfaces may be printed by known methods. It is difficult, using known means, to print surfaces having contours in several directions.

This invention provides a means of printing multi-contoured surfaces such as molded and cast plastic and metal parts. While lettering can be printed by this method, the primary use to which the invention immediately applies is printing decorative effects to shaped parts. Wood, leather, and cloth patterns are of primary concern.

In its preferred form, the process employs a rubber diaphragm **12** with the desired pattern molded into it. This diaphargm **12** is attached to an open box **10.** The inside **14** of the box is also connected to a source of vacuum **23** and is also connected to a source of compressed gas. The box is attached to the piston rod **17** of a press. A lower box which acts as a part positioning nest is attached to the lower member **20** of the press and it is also connected to a source of vacuum **26.** A plate coated with ink or a suitable paint is supported below the box.

To coat an article, such as a plastic toy or a part of an automobile or a part of a refrigerator, the upper box **10** is raised away from the lower box **11** by means of the cylinder **16** which may be actuated by air in a well known manner. The plate **13** is set in place as shown in FIG. **4** over the bottom box and ink is applied to the pattern on diaphragm **12.**

The upper box **10** is then lowered into engagement with the plate **13** as shown in FIG. **5.** It is very important that a seal **31** be maintained around the outer periphery of the box but a vent **30** is provided through the plate **13** to allow air displaced from between the diaphragm and the plate to flow into the lower box.

Compressed air is then admitted through connection **23** to force the diaphragm **12** into engagement with the pattern of the plate **13.**

The vacuum is then applied through line **24** which pulls the diaphragm **12** away from the pattern. The boxes can then be separated as indicated in FIG. **7.** The article **27** to be coated is then placed in the bottom box **11,** as indicated in FIG. **7.**

The top box is then closed on the bottom box as indicated in FIG. **8** while maintaining vacuum in line **24.**

Pressure is then admitted through line **23,** as indicated in FIG. **9,** forcing the diaphragm into engagement with the article **27.** Simultaneously a vacuum is applied to pull the diaphragm firmly into engagement with the article.

The vacuum may then be turned off from line **28** and turned on to line **24,** lifting the diaphragm off engagement with the article **27.** The boxes may then be separated as shown in FIG. **11** and the article removed.

The press may be programmed by a method familiar to those skilled in the art to carry out the method automatically.

The foregoing specification sets forth the invention in its preferred practical forms but the structure shown is capable of modification within a range of equivalents without departing from the invention which is to be understood is broadly novel as is commensurate with the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An apparatus for coating an article of manufacture comprising,

a lower box having a relatively flat bottom and spaced sides extending upwardly from said bottom defining an open topped enclosure,

an article nest supported on said bottom,

a relatively flat pattern plate having an aperture therein adapted to be removably supported on the upper edge of said lower box,

said pattern plate adapted to be inked,

an upper box closed at its top and having downwardly extending sides, extending downwardly from said top,

a flexible diaphragm having a pattern formed thereon attached to said sides of said upper box,

means to introduce air under pressure in said upper box behind said diaphragm,

means to introduce a vacuum into the space behind said diaphramg in said upper box,

means to move said upper box down to bring its sides into engagement with the upper edges of the sides of said lower box,

and sealing means for forming a seal between the engaging edges of said boxes,

means to admit gas under pressure into the space in said upper box behind said diaphragm and to move said diaphragm into engagement with said pattern plate when said pattern plate is supported on said lower box,

and means to move said upper box upward from said lower box whereby said pattern plate can be removed and said upper box can be moved into engagement with said lower box and said diaphragm with said inked pattern thereon can be forced downward into engagement with said article supported on said article nest,

and vaccum means in said lower box for drawing said diaphragm into tight engagement with said pattern.

2. The apparatus recited in claim 1 wherein said upper box is supported on the piston rod of a press and said lower box is supported on the platen of said press.

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