Feb. 3, 1953 A. L. SMITH 2,627,485

PROCESS OF APPLYING INKED INDICIA TO A RUBBER ARTICLE USING AN IMAGE REPRODUCING FILM

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FIG. 1.

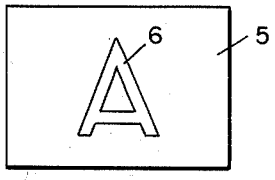


FIG. 2.

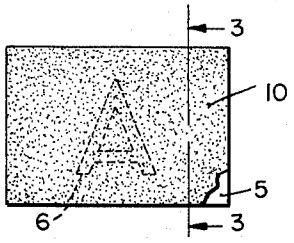


FIG. 3.



FIG. 4.

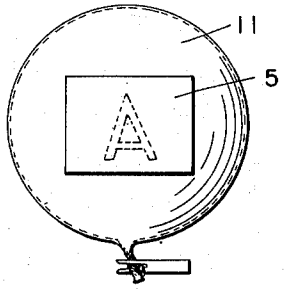
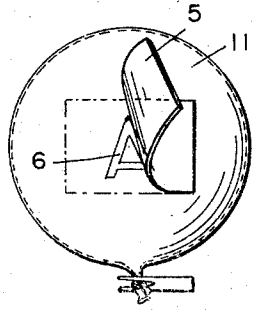


FIG. 5.



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PROCESS OF APPLYING INKED INDICIA TO A RUBBER ARTICLE USING AN IMAGE REPRODUCING FILM

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7 Claims. (Cl. 154—95)

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My invention has to do with the removal of inked indicia from one surface, such as a sheet of printed matter, and applying them to an article. While its utility is by no means confined to such use, the invention is peculiarly well suited for use in applying indicia to articles of manufacture which, because of their size or nature, cannot be practically printed upon in a printing press. Among such articles are, for example, elastic rubber products such as rubber balloons.

Heretofore various methods have been used for applying indicia to rubber products, including printing or stamping, painting or spraying, and transferring with the addition of vulcanization or cementing. So far as I am aware, these methods all have serious disadvantages in one or more of the following particulars, namely, blurred reproduction, limitations as to the number of colors which can be reproduced, lack of durability, and costliness of manufacture.

It is a main object of my invention to overcome those shortcomings and limitations in applying indicia to such articles.

The following are among the more particular objects of the invention:

(a) To apply inked indicia to rubber surfaces in any desired number or combination of colors and, at the same time, to obtain accurate registration of the colors and clear definition of characters;

(b) To obtain a novel article of manufacture wherein a rubber surface of the article is integrated with a rubber film permeated by the desired indicia;

(c) To obtain a novel product which possesses the desired properties of toughness, pliability and durability and to which the indicia is fixedly and permanently applied;

(d) To obtain a product and method of producing it which provides definite advantages over previously known products and methods;

(e) To provide a method of said character which is simple to perform and which may be economically carried out with commercially available materials; and

(f) To provide a novel method of removing inked indicia from one surface and applying it to another surface without loss of any of its detail and without running or blurring.

Other objects and advantages will appear hereinafter.

Generally speaking, my process involves first printing the indicia on a sheet, then transferring the indicia to or reproducing them upon a film

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which is compatible with the surface onto which the indicia are to be finally applied, and then integrating or combining the film with said surface.

Without intending thereby to limit the broader scope of my invention as defined by the appended claims, I shall now describe a presently preferred embodiment of it as utilized in the removal of inked indicia from a printed sheet and applying it to an elastic rubber article such as a rubber balloon.

For purposes of the ensuing description I shall refer to the accompanying drawings wherein:

Fig. 1 shows an indicia bearing sheet;

Fig. 2 shows the sheet of Fig. 1 coated;

Fig. 3 is a section taken on line 3—3 of Fig. 2;

Fig. 4 shows the film carrying indicia sheet superimposed on a rubber balloon; and

Fig. 5 shows the sheet being removed from the balloon.

First, I print the indicia 6 upon a suitable sheet, such as a sheet 5 of paper or fabric which is permeable by or absorbent of a softening agent such as water; it being my preference that the sheet be freely flexible or pliable for reasons which will hereinafter become apparent.

The printing preferably should be done with an ink compatible with the film to be hereinafter described, which, in this embodiment, is of rubber; and I have found that commercial grades of printing inks are ideal for the purpose.

In fact, the original printing of the indicia on such sheet is not necessarily a part of my process, since any indicia printed in printing ink may be used. For instance, I have clipped pictorial illustrations and printed matter from ordinary magazine publications and have successfully used those in my process as the sheet carrying the printed indicia. Of course, if the indicia must have certain orientation after being applied to the end product, such as reading matter must have, it should be printed in reverse—that is, from right to left, since it becomes reversed in the course of carrying out my process.

The printing of the indicia may be done in as many colors as desired, since my process has no limitations as to colors or combinations of colors. Preferably the printed surface should be smooth.

The next step of my process is to transfer the indicia from the printed surface onto a film 10. The base material of the film preferably should be compatible with the material of the surface to which the indicia are finally to be applied and preferably should contain a mutual

solvent for both said base material and said surface.

If the surface to finally receive the indicia is of rubber, the film should have a rubber base and should contain a rubber solvent.

I have found the well known commercially available crude rubber adhesives to be suitable for forming the film. While such adhesives contain a rubber solvent, I prefer to add a volatile solvent to it to thin it sufficiently to render it freely flowable. Any of the well known volatile rubber solvents will suffice, such as benzine, benzene, solvent grade gasoline or others listed at pages 96–97 of "Industrial Solvents," by Mellan. Optionally, any of the well known classes of vulcanizing agents may be added, such as sulfur or sulfur monochloride. Of course commercial grade crude rubber adhesives also contain various other ingredients as tackifying agents, activators, etc., but those elements are not essential to my process, and so far as I have been able to determine, neither do they impair the process.

In a simple example, I have carried out my process by using a film prepared merely by dissolving coagulated plantation crude rubber in a volatile rubber solvent such as benzine, enough of the solvent being used to provide a freely flowable liquid solution.

In another example, I use one part commercial grade crude rubber adhesive, such as "Firestone 3–K–2," and one part benzine, or equal solvent, by volume.

To effect the transfer to the film from the printed surface, I flow a thin film of this solution over the printed surface, and then allow the film partially to volatilize to a tacky state. By the time the thus deposited film reaches the desired tacky state, the printed indicia originally appearing upon the printed surface will have become transferred to the film, somewhat permeating the film. Then, while the film is in this tacky, partially volatilized and unstable state, I superimpose it, with the printed sheet attached thereto, on the surface to which the indicia are to be finally applied, here shown as a rubber balloon 11, and press them together; then I volatilize the remaining volatile elements of the solvents. By the term "unstable," as used herein and in the appended claims, I means that the film is not fully cured and is so thin, fragile and weak that it is incapable of being handled or applied except by superimposing the film coated printed sheet upon the article to be marked. Moreover the film is so thin that, after being applied, it does not distinguishably add to the thickness of the marked article.

If the film is of rubber or has a rubber base, as above described, the surface to which the indicia is to be finally applied should also be of rubber or have a rubber base sufficient to be compatible with the rubber film and to be soluble in the solvent remaining in the tacky film.

When the superimposed elements are pressed together, the film integrates or fuses with the rubber surface, (Fig. 5) which fusion or integration results from the action of the mutual solvent in the tacky film. When the integration is thus effected, the sheet which originally carried the printed indicia is removed (Fig. 5) from the film by subjecting it to a water bath, until the water permeates and softens the sheet sufficiently to free it from the film.

The end product thus obtained is a rubber-surfaced article having integrated therewith a rubber film displaying a true reproduction of the indicia in finely executed detail, without any blurring or running. I have found my process particularly well suited to applying indicia to rubber balloons, as well as to the reproduction of printed maps and other indicia on rubber sheets.

While I have described my process as applied to rubber articles or surfaces, it should be understood that the broader concept of the invention contemplates its use with other materials wherever the inked indicia are compatible with the film and where it is possible to have the film contain a mutual solvent for the base material of the film and the base material of the surface onto which the film is to be applied.

I claim:

1. The process of applying inked indicia to a rubber article which comprises applying said inked indicia to a surface of a sheet, coating said indicia with a rubber adhesive solution containing a rubber solvent whereby to cause said indicia to be picked up from said surface by said solution, curing said solution to the state of a tacky film, superimposing said sheet and its carried film upon a surface of said rubber article with said film in contact with said latter surface, and then removing said sheet.

2. The process of claim 1 wherein said solution is in a freely flowable state as said sheet is coated therewith.

3. The process of claim 1 wherein said solution has a crude rubber base.

4. The process of claim 1 wherein said solvent is volatile.

5. A process of the class described comprising the steps of applying inked indicia to a surface of a flexible sheet, coating said indicia with a film of rubber adhesive solution containing a volatile rubber solvent and drying said film to a tacky state.

6. As a new article of manufacture, a flexible sheet bearing upon one of its surfaces a tacky film of rubber adhesive containing a volatile rubber solvent, said film having inked indicia integrated therewith.

7. As a new article of manufacture, a flexible sheet bearing upon one of its surfaces a tacky film of crude rubber adhesive containing a volatile rubber solvent, said film having inked indicia integrated therewith.

ARTHUR L. SMITH.

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