

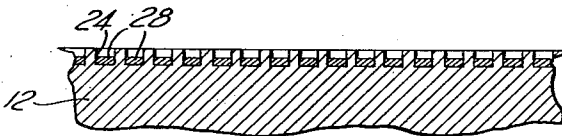
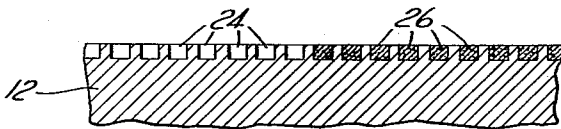
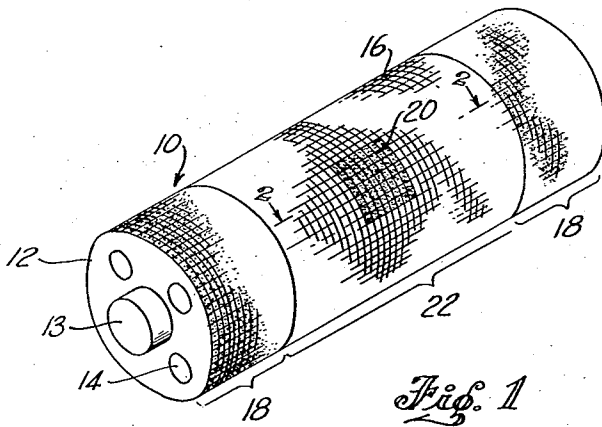
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METHOD OF MAKING INTAGLIO CYLINDERS

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METHOD OF MAKING INTAGLIO CYLINDERS

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This invention relates to the art of coating and printing and aims to provide a novel and improved method of making an intaglio cylinder for applying a coating or marking material in predetermined quantities to predetermined areas of a sheet or web, and a novel method of making such a cylinder.

In the manufacture of wrappers, labels and the like, the appearance of the finished product is usually enhanced by the application of an outside layer of some glossy, transparent coating material, such as varnish, lacquer, or one of the available thermoplastic coatings which are applied hot and without the aid of solvents. Such coating materials may be effectively and conveniently applied by the gravure method in which an intaglio printing cylinder having the usual etched screen surface in all areas to be coated or printed is used. However, when the coating material is not to be applied over the entire surface of the sheet or web, but only in predetermined portions thereof, or is to be applied in layers of different thicknesses, the cost of preparing the necessary gravure cylinder for each new design and application is excessive. Consequently, in situations where a comparatively small amount of the coated or printed material is desired, the cost of the cylinders may prevent the use of the gravure method or may prevent the use of the best coating material.

I have discovered that an effective gravure cylinder for applying coating or marking materials to a sheet or web may be made in such a manner that its cost is not prohibitive; and the design or depth of etch or both may be easily and quickly changed so that the same cylinder may be used for many different designs and depths of coating layers.

In accordance with my invention, a normal gravure printing cylinder of the desired diameter and having an etched screen pattern over its entire operating surface, may be provided with any desired design or depth of etch by filling in the engraved cells over those portions of the surface where no coating or printing is desired, or by partially filling the engraved cells where a layer of decreased thickness is to be applied, with a resinous material which may be set to a substantially impervious mass by proper subsequent treatment.

The above and other features and objects of the invention will become apparent upon consideration of the following detailed description and the accompanying drawing, in which:

Fig. 1 is a perspective view of a gravure cylinder

der embodying the features of the present invention and particularly adapted for the application of a thermoplastic coating material;

Fig. 2 is an enlarged fragmentary vertical sectional view taken substantially along the line 2—2 of Fig. 1; and

Fig. 3 is an enlarged vertical sectional view, similar to Fig. 2, showing a portion of a gravure cylinder in which the depth of the engraved cells has been decreased.

Referring now to Fig. 1, it will be seen that an improved intaglio cylinder 10, constructed in accordance with and embodying the features of my invention, comprises a cylindrical shell-like member 12 of the desired diameter and length and adapted to be mounted upon a suitable shaft (not shown) for use in a rotogravure printing or coating apparatus. In the present instance, the cylindrical shell-like member 12 is shown as provided with a plurality of longitudinal passages 14 through which a thermal treating fluid may be circulated or in which suitable strip heaters may be mounted so that the cylinder 10 may be heated and used with thermoplastic material; but it will be understood that if the cylinder 10 is to be used with thermoplastic or other materials requiring heating, said cylinder may be heated in any desired manner, such as by an external gas flame or electric means. The cylinder 10 is provided over its entire outside operating surface 16 with the usual etched screen pattern 16 which, depending upon the maximum thickness of coating desired, may be of any desired number of lines to the inch.

With a normal gravure cylinder it would ordinarily be necessary to provide a different cylinder for each different thickness of application of the coating or marking material and each different design or pattern that was desired to be applied. However, in accordance with my invention, one cylinder, such as the cylinder 10 described herein, may have the normal screened surface thereof changed to provide the desired design or pattern. For example, should it be desired to apply a substantially centrally disposed strip of coating material with a small regularly spaced uncoated rectangular portion in the center thereof, annular areas 18 at each end of the cylinder and a suitable rectangular area 20 may have the engraved cells included therein filled with a resinous material which will set to a substantially impervious mass when given a suitable treatment such as maintaining the material at an elevated temperature for a predetermined time depending upon the characteristics of the par-

ticular resinous material employed. The cylindrical length of the areas 18 is such that an intermediate zone or area 22 for applying coating material in the desired width is provided.

It will be understood that any desired and suitable material may be used for filling the engraved cells. I have found, however, that a mixture of 80 parts of a dibasic acid-polyhydric alcohol resin modified with a non-drying oil, such as the alkyd resin known as "Rezyl 12", 10 parts of a maleic acid modified ester gum, such as that known as "Amberol-801," and 10 parts of titanium dioxide, provides a suitable polymerizing material which will set into a substantially impervious mass when heated to an elevated temperature and maintained at such temperature for a predetermined time. This material may be applied to the areas 18 and 20 of the cylinder 10 in any convenient manner such as that to be now described.

Assuming that the cylinder 10 is 32 inches in length and it is desired to provide an effective coating length of 22 inches, the areas 18 will then each have an effective length of five inches. The central area 22 may be wrapped at the edges thereof with paper or tape to protect the edges of that portion of the engraving which is not to be treated. Similarly, the edges of the area 20 may be protected with a suitable shielding tape. With the edges of all portions of the cylinder which are not to be treated properly shielded in this manner, the resinous material, after being heated to a temperature at which it becomes thoroughly plastic (about 200° F.) may be applied to the areas 18 and 20 by means of a suitable spatula or knife. The cylinder 10 is preferably heated during this application to a temperature of about 200° F. so that the material will not set or harden immediately upon application but will be sufficiently plastic so that it may be forced into the cells and effect a complete filling thereof. As shown in Fig. 2, the engraved cells or depressions 24 are effectively filled with quantities 26 of the resinous material. In order to remove the excess material, the cylinder 10 may be rotated under power at a comparatively slow speed and the applying knife used as a scraper so as to produce a substantially plane cylindrical surface. When this is accomplished, the shields or tapes may be removed and the temperature of the roller raised to about 425° F. for a period of about one hour. This causes the resinous material to polymerize and set into a substantially inert and impervious film which is unaffected by the coating material to be applied and provides an effective non-printing or non-applying area on the cylinder 10. When it is desired to change the design, the material may be removed with a solution of caustic soda.

Another application of the broad principle of my present invention is illustrated in Fig. 3. When a coating operation is being performed by means of a gravure cylinder having an etched screen surface, the amount of material which is applied to the web is governed or predetermined by the size and depth of the engraved cells. Normally such a gravure coating roller is entirely inflexible in the matter of varying the amount of material which may be applied therewith. I have found, however, that, if it is desired to reduce the quantity or amount of coating material applied with a given gravure cylinder, this may be accomplished by partially filling the engraved cells with a material which may be subse-

quently treated so as to render it substantially inert or impervious and unaffected by the coating material which is to be applied. As indicated in Fig. 3, the engraved cells 24 of the cylindrical member 12 may be partially filled with a quantity 28 of such a material. This has the effect of reducing the depth of the engraved cells so that the quantity of coating material picked up thereby will be reduced.

For example, with a gravure cylinder having an etched screen surface with substantially 90 lines to the inch, it was found that the weight of the coating material applied was approximately nine pounds per ream of paper. In order to reduce the amount of coating material applied, a material consisting of an alcohol soluble phenol-formaldehyde resin was dissolved in alcohol, in the amount of about 30 parts of resin to 70 parts of alcohol. This liquid was applied to the etched screen surface 16 of the cylindrical member 12 by rotating the cylinder under power with the usual conventional doctor blade in contact therewith, and applying the resin solution to the engraved surface by means of a brush. The doctor blade removed the excess material so that the solution filled the cells. The rotation of the cylinder was then stopped and the solvent permitted to evaporate. Following this the roller was heated to a temperature of approximately 350° F. for a period of about one-half an hour so as to cause the resin to polymerize and be rendered insoluble and non-meltable. The cylinder thus treated when used for applying a coating material was found to apply approximately five and one-half pounds of coating material to the ream of paper.

From the foregoing description, it will be apparent that I have provided an improved intaglio cylinder which is particularly useful for applying coating materials in varying quantities and in different designs. While I have described two specific embodiments of the basic principles of my invention, it will be understood that these two principles could be combined to produce a cylinder having areas in which no coating material would be applied and areas in which coating material would be applied in reduced quantities. It will be also understood that other materials may be used for filling the cells of the engraving than those specifically mentioned, and that the depressions or cells of the screen pattern could be produced by a milling or knurling operation instead of by etching in the photoengraving process. Moreover, various changes may be made in the construction and method of production of the cylinder and various features or steps thereof may be employed without others, without departing from my invention or sacrificing any of its advantages.

What I claim is:

1. A method of treating an intaglio cylinder having engraved cells in the surface thereof so as to alter the character of the coating or marking operation that may be performed therewith, which comprises filling the engraved cells in predetermined portions of the surface with a solution of a heat convertible resin and a solvent, causing the solvent to evaporate, and heating said cylinder to an elevated temperature so as to cause the resin remaining in each engraved cell to be converted into a substantially impervious mass.

2. A method of treating an intaglio cylinder having engraved cells in the surface thereof so as to alter the character of the coating or mark-

ing operation that may be performed therewith, which comprises heating the cylinder to an elevated temperature at which a heat convertible resinous material will be plastic, applying a heat convertible resinous material heated to about the temperature of the cylinder to predetermined portions of the surface so as to fill the engraved cells therewith, removing excess resinous material from the surface, and maintaining the cylinder at a higher elevated temperature for a sufficient time to cause the resinous material in each filled engraved cell to be converted into a substantially impervious mass.

3. A method of treating an intaglio cylinder, having uniformly spaced depressions over the major portion of its outside cylindrical surface, so as to provide a cylinder which may be used

for coating a sheet or web that is narrower than said cylinder, which comprises heating a heat hardenable resinous material to a temperature at which it becomes plastic, applying the plastic resinous material to annular areas at each end of the cylindrical surface so as to fill the depressions in said areas with an excess of said resinous material, scraping off the excess resinous material from the annular areas of said cylindrical surface so as to leave the depressions completely filled with said resinous material, raising the temperature of the cylinder to a point at which the resinous material will polymerize, and maintaining the cylinder at such temperature until the resin in the depressions of said annular areas has set into a substantially impervious mass.

ARTHUR M. WICKWIRE, Jr.