June 21, 1955 J. VISCARDI 2,711,132

METHOD FOR PRINTING AND COATING

Filed July 28, 1952

FIG. 2.

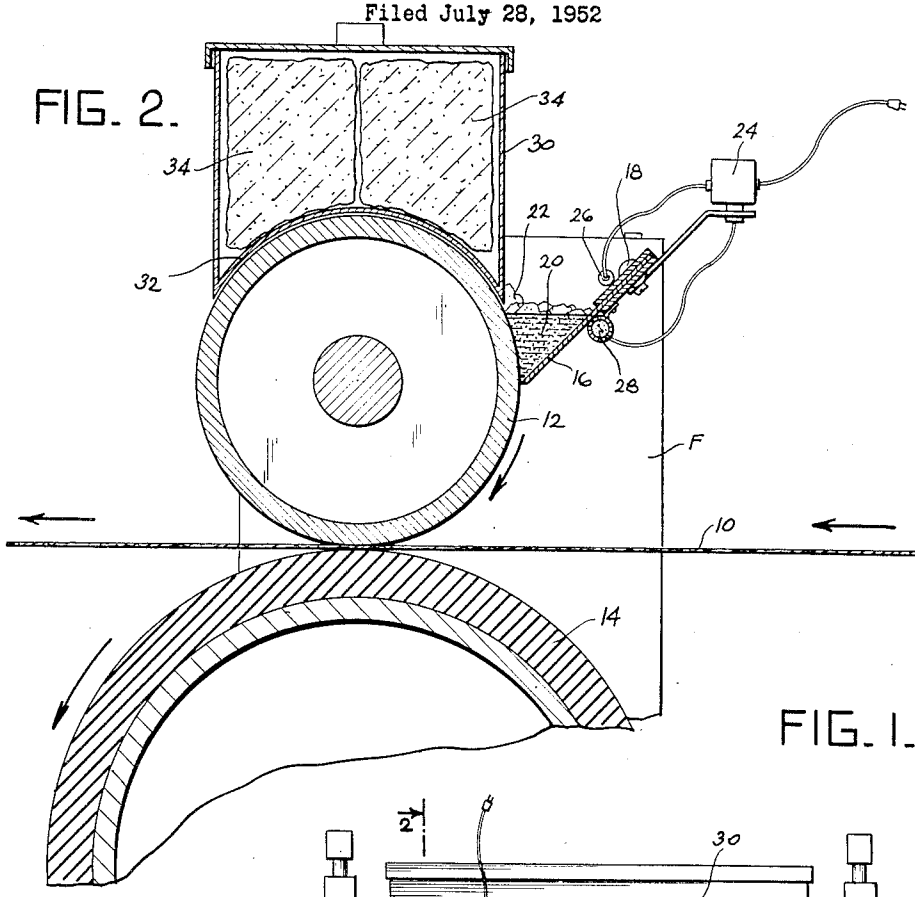


FIG. 1.

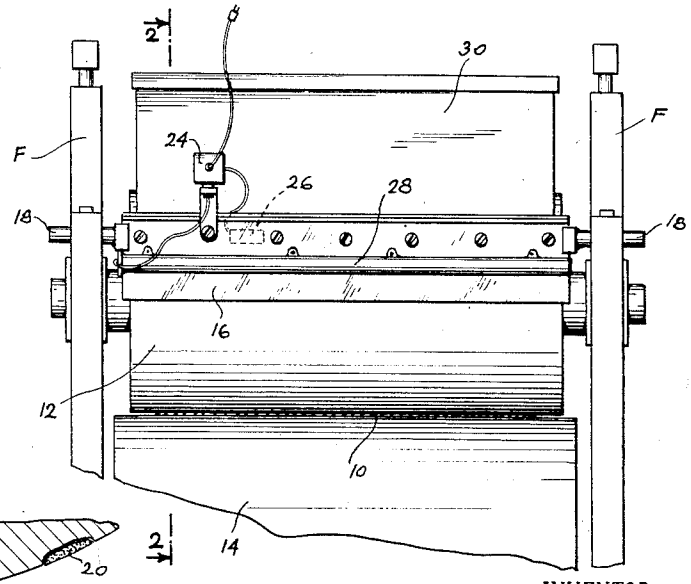
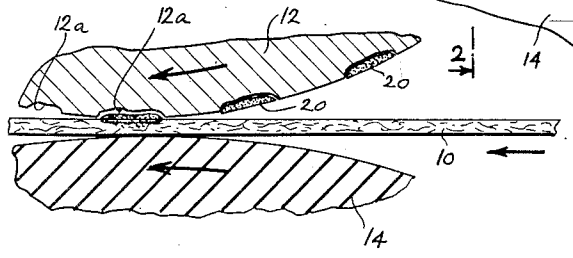


FIG. 3.



INVENTOR.
JOHN VISCARDI
BY Mock & Blum
ATTORNEYS

United States Patent Office 2,711,132 Patented June 21, 1955

2,711,132

METHOD FOR PRINTING AND COATING

John Viscardi, Lodi, N. J., assignor to Viscardi Corporation, New York, N. Y., a corporation of New York

Application July 28, 1952, Serial No. 301,312

3 Claims. (Cl. 101—170)

This invention relates generally to the art of printing and is concerned more particularly with the provision of a novel method and apparatus specially adapted for gravure or intaglio printing.

Among the objects of the present invention are the provision of a method and apparatus of the character indicated which will expand the use of all types of printing and coating materials such as inks, adhesives, paints, lacquers and the like so that a greater production of finished material will be obtained per gallon of marking material used; which will provide a more even distribution of marking or coating material and give better overall coverage; and which will eliminate static, spattering, tailing, etc. and in general produce a superior type of printed or coated product.

The foregoing objects are achieved in the practice of my invention by applying heat from a suitable source and in a suitable manner to the printing or coating material employed so as to thin the material down to the desired consistency or maximum expansion for application to the particular apparatus used in a given instance, such as engraved printing cylinder in intaglio printing, coating knife, flatbed printing type or the like. After the printing or coating material has been thinned to the desired consistency for application, which will of course vary according to the material used, it will generally be too thin for a proper printing impression to be made. Accordingly, I have found that if a suitable arrangement is employed for simultaneously directly cooling the engraving cylinder or other printing or coating apparatus, excellent results are obtained. It is such direct cooling that constitutes the principal feature of the invention herein. In the preferred embodiment of the invention illustrated in the drawing wherein an engraved printing cylinder is shown, the desired cooling effect may be obtained by the use of dry ice or any other suitable refrigerant placed in a refrigerant receptacle disposed about the upper portion of the printing cylinder.

By the practice of the present invention the amount of ink, paint, lacquer or other printing or coating material is drastically reduced over that required in conventional practice, static and spattering are eliminated and a superior overall printing or coating job is obtained.

With the present invention, it is possible to obtain a greater deposit of color than is possible with known methods. The normal depth, according to known methods, is approximately .010". With the improved method, it is possible to go as high as approximately .025" to .030". For other printing operations, the depth will vary according to the type of material to be printed, but at all times the depth can be approximately doubled by the invention herein.

The foregoing objects as well as additional objects and advantages of the invention will be readily apparent in the course of the following detailed description taken in connection with the accompanying drawing which illustrates a preferred embodiment of the invention, and wherein:

Fig. 1 is an elevational view of apparatus by means of which the method of the invention may be practiced;

Fig. 2 is a fragmentary sectional view of the apparatus shown in Fig. 1 taken on line 2—2 of Fig. 1; and

Fig. 3 is a fragmentary enlarged detail view illustrating the manner in which the printed or coated impression is made on the web of material by the printing cylinder at the point of transfer.

Referring now to the drawings in greater detail, a web 10 of textile material or any other material which is to be printed or coated is fed in a convenient manner to a printing unit, which in the preferred illustrated embodiment of the invention comprises an engraved printing cylinder 12 and a resilient impression cylinder 14 mounted on a frame F. A suitable knife or doctor blade 16 is mounted by means of lateral supports 18 at a downward angular inclination to the printing cylinder 12 and forms a trough or reservoir for the ink 20 or other printing or coating material to be applied to the surface of said printing cylinder. End retaining walls 22 are provided for retaining the ink 20 or other material and preferably comprise soft material such as cotton waste or paper in order to avoid scratching or other injury to printing cylinder 12 during its rotation.

Suitable heating means are associated with the knife blade 16 in order to obtain the desired consistency of the ink 20 or other material prior to its application to printing cylinder 12. Any suitable heating medium may be employed such as electricity, gas or the like. In the preferred embodiment of the invention the heating means takes the form of a variable thermostatic control 24 for setting to a desired temperature range depending upon the printing or coating material employed. A thermosensitive element 26 cooperates with the thermostatic control 24 to supply the desired amount of current to an elongated heating element 28 secured to knife blade 16.

Ordinarily, the ink 20 or other coating material is heated to a temperature of approximately 110° F. However, this may vary according to the consistency of the material and atmospheric conditions.

The described heating arrangement or a functional equivalent thereof will thin the ink or other material to the desired consistency for even distribution on to the surface of the engraved printing cylinder or other printing or coating element, thereby eliminating static and spattering and resulting in a minimum waste of material. However the ink or other material will then be too thin for proper transfer to the web 10 by the printing cylinder 12 and would have a tendency to run and smudge the material being coated or printed. Thus in order to provide for proper transfer of the printing or coating material to the web 10, means are further provided for rapidly directly cooling the printing cylinder 12 so that in turn the ink 20 or other material will be cooled sufficiently for proper coating or printing transfer.

In the illustrated embodiment of the invention the refrigerating means takes the form of a refrigerant tank 30 disposed above printing cylinder 12 and having a concave bottom wall segment 32 substantially concentric with the printing surface of said printing cylinder and spaced as closely adjacent said cylinder as will permit free rotation thereof.

Any suitable refrigerant 34, such as dry ice or the like, may be introduced into tank 30 in order to cool the printing cylinder 12. For best results, it is desirable to cool the said printing cylinder to approximately 40°–45° F. Further it will be understood that alternative means may be provided other than that just described and illustrated in the drawing for cooling the printing cylinder 12 and that the particular design of the refrigerant means in any given case will of course depend upon the particular structure of the printing or coating

element which effects transfer of the printing or coating material. Thus, for example, where an engraved printing cylinder is employed as illustrated in the drawing, the printing cylinder might be designed in such a manner as to permit direct introduction of the refrigerant within the body of the cylinder itself. Furthermore in the event that flatbed printing type or a coating knife were employed, the construction of the refrigerating means would be suitably modified in accordance with the particular conditions of use and the physical structure of the printing or coating element in a given case.

Fig. 3 is an enlarged fragmentary detailed view illustrating the advantages obtained in the practice of the method of the present invention wherein the printing or coating material is heated prior to application to the printing or coating element while the printing or coating element is simultaneously cooled. In the enlarged detail view the engraved cells or recesses 12*a* of printing cylinder 12 are shown retaining deposits of material such as ink 20 which are to be transferred to the surface of the web 10 passing between the printing cylinder 12 and the impression cylinder 14. Because of the fact that the ink 20 or other material has been initially heated by the heating element 28 prior to its application to printing cylinder 12 by knife blade 16, the temperature differential existing between the ink and the walls of the engraved cells 12*a* of the cooled printing cylinder 12 will cause the ink to form a protective peripheral film at the interface between the hot ink and the cool walls of the engraved cells 12*a* upon impingement of the hot ink or other material thereagainst. Accordingly, as shown in Fig. 3, at the point of transfer of the ink 20 or other material to the web 10 the cooled ink deposit within each engraved cell 12*a* will have a greater affinity for the material of web 10 than for the wall of said cell 12*a* and will be cleanly and positively transferred to the material being printed or coated. Since the ink has been cooled there will be no tendency to run or smudge the material and no excess material will remain within the engraved cells beyond the transfer point to build up and foul the printing cylinder.

Thus it will be readily seen that by the practice of the method of the present invention the amount of ink, paint, lacquer or other material may be drastically reduced over conventional practice, static and spattering are eliminated and a better overall printing or coating job may be obtained.

From the foregoing, it will be apparent that in the practice of my invention, I can use an ink or the like which is solid at room temperature, or which is liquid at room temperature. Heretofore, even if the printing cylinder were cooled, it was difficult to print with liquid ink, because if the liquid ink at room temperature was applied to the cylinder, it was difficult to obtain proper distribution of the ink over the surface of the printing cylinder. Heretofore, also, if an ink which was solid at room temperature was heated prior to its application to an uncooled printing cylinder, there was a tendency for the ink to become too thin for proper transfer to the web by the printing cylinder, and spattering and other objectionable effects occurred.

In summary, it will be apparent that I overcome the above-mentioned difficulties by my improved method of both cooling the printing cylinder and heating the marking material.

Although I have illustrated and described my invention in its application to intaglio printing it is apparent that it may be readily employed in connection with other well-known types of printing equipment. Furthermore, various modifications may be made in the apparatus and method of the invention without departing from the

scope thereof and it is intended that all matter contained in the foregoing description and shown in the accompanying drawing be interpreted merely as illustrative and not in a limiting sense.

What is claimed is:

1. A method of printing with marking material whose flowability increases when it is heated above its liquefaction temperature, said method comprising the steps of heating said marking material to a temperature which is substantially above normal room temperature of 20° C.–30° C. and which is substantially above the liquefaction temperature of said marking material, cooling a transferring element which has engraved cells substantially below said normal room temperature and substantially below said liquefaction temperature of said marking material, maintaining the material being printed at substantially said normal rom temperature, applying said heated marking material to said cooled transferring element, and transferring said marking material from said marking element to said material being printed after said marking material has solidified adjacent the walls of said cells only.

2. A method of printing with marking material which is liquid at normal room temperature of 20° C.–30° C. and whose flowability increases when it is heated above said normal room temperature, said method comprising the steps of heating said marking material to a temperature which is substantially above said normal room temperature, cooling a transferring element which has engraved cells substantially below said normal room temperature and substantially below the liquefaction temperature of said marking material, maintaining the material being printed at substantially said normal room temperature, applying said heated marking material to said cooled transferring element, and transferring said marking material from said marking element to said material being printed after said marking material has solidified adjacent the walls of said cells only.

3. A method of printing with marking material whose flowability increases when it is heated above its liquefaction temperature, said method comprising the steps of heating said marking material to a temperature which is substantially above normal room temperature of 20° C.–30° C. and which is substantially above the liquefaction temperature of said marking material, cooling a transferring element which has engraved cells with a depth from substantially in excess of ten thousandths of an inch to substantially thirty thousandths of an inch substantially below said normal room temperature and substantially below said liquefaction temperature of said marking material, maintaining the material being printed at substantially said normal room temperature, applying said heated marking material to said cooled transferring element, and transferring said marking material from said marking element to said material being printed after said marking material has solidified adjacent the walls of said cells only.

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