

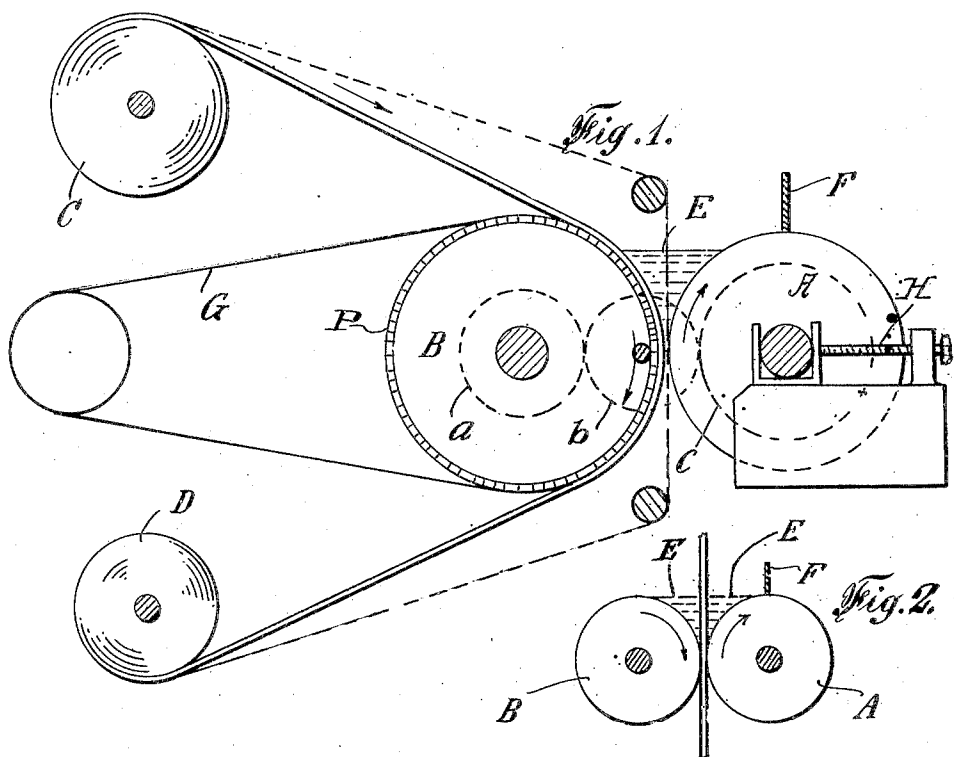
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J. M. COOPER

PROCESS OF PRINTING, VARNISHING, AND THE LIKE

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Inventor
Jehangir Waneckji Cooper
By his Attorney
Alfred J. Smith

UNITED STATES PATENT OFFICE.

JEHANGIR MANECKJI COOPER, OF BOMBAY, BRITISH INDIA.

PROCESS OF PRINTING, VARNISHING, AND THE LIKE.

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My invention consists in an improved method of printing, printing in relief, varnishing, gluing, proofing, coating, spreading and the like, or combining certain of these operations on paper, cloth and other materials, and in an apparatus for carrying out said method.

The present invention is similar to my earlier invention as disclosed in the Patent 1,359,034, issued to me on November 16th, 1920, in (1) that pliable patterns (e. g. a piece of lace or stencil paper) are used, and (2) that the said patterns do not come into contact with the colors, or printing agent. Whenever the term "color" is used herein, it embraces any kind of printing medium.

The present invention differs from my said earlier invention in (1) that in addition to the pliable patterns, use can be made under certain conditions of engraved cylinders, whether of metal, rubber or the like; (2) that it does not employ a smooth metal cylinder covered all around with a film of color; (3) that the color supply rests directly on the material to be printed on (it is not suggested that the entire color-supply must thus rest, provided however that sufficient color is continuously fed as from a hopper), and (4) in the result, viz, that the printing is obtained from the sunken and cut-out portions of the pattern and not from the raised portions as is the case in my earlier invention. However, as the color supply rests on the printing material itself, the raised portions come out with a very light tinted effect. When the color is very slippery (i. e. not tacky) and the material to be printed on very smooth and glossy, it is possible to avoid even this tint from the raised portions.

The apparatus devised for carrying out this invention differs from the one forming the subject matter of my pending application, Ser. No. 670,831, filed October 26th, 1923, mainly in that instead of three cylinders I use only two cylinders, entirely dispensing with the color cylinder, and in its place putting the pattern cylinder. In the accompanying drawing illustrating my invention Fig. 1 is a diagrammatic view of an apparatus carrying out the invention, while Fig. 2 is a view similar to Fig. 1, but omitting some of the parts shown there, of an apparatus for simultaneously printing on both sides.

According to my new invention, the pro-

cess is carried out in the manner hereafter set forth. Two cylinders, a smooth cylinder A and the so-called pattern cylinder B are rotated in the same direction as shown by the arrows, so that their peripheral surfaces move in opposite directions. A is rotated from B, by means of a toothed gearing *a, b, c* at a considerably reduced speed. By revolving A in the same direction as B a fresh clean surface is continuously presented at the line of contact between A and B so that the space between A and B at this place remains of the same width, thus avoiding the possibility of the color caking at this line of contact. It is obvious that if A were kept stationary, the space referred to, on account of the caking of the color, would become narrower, whereas, if A and B were to revolve in opposite directions, the film of color remaining on the printed material (or on B in the case of spreading) would not be smooth, due to the "bridging" of the color at the line of contact.

Cylinder A is made adjustable relative to cylinder B by means of an adjustable bearing H to enable cylinder A to be positioned closer to or further away from cylinder B, in accordance with the thickness of the material to be treated, type of color, varnish, or the like, and also for varying the printing pressure.

With the cylinder A cooperates the doctor F, to keep the color in the color box and also to wipe its peripheral surface thoroughly clean so that the condition of the said space remains the same as at the start.

On the smooth cylinder B is mounted the pliable pattern as indicated at P. The material to be printed on is fed from the reel C, passes around B being held under suitable tension so that it is held taut and is wound upon D. E is the color box formed by A and B and side brackets (not shown) to prevent the color from flowing down.

As the material to be printed on (the better the result the more elastic the material, e. g. rubberized sheeting) passes under pressure between the two cylinders A and B, along with the color riding on its surface it will squeeze through the space referred to. As a result, almost all the color will be scraped away by A from those portions of the printing material where it is held in relief by the pliable pattern below it, whereas the color will stay in the portions not so held in relief, i. e., in the depressed portions.

As the result, a printed pattern, the reverse of the pliable pattern on the pattern cylinder B, will be seen on the material which is being printed on. If the pliable pattern has a relief of varying thickness, the print will show corresponding but reverse gradations of tone.

It will now be understood that the thicker the material from which the pliable pattern is cut out, the thicker will be the film of color that will stay in the depressed portions of the printed material, so that a relief effect (simultaneously with the printing) even to the touch is attained by suitably determining the thickness of the pattern material, the elasticity of the material to be printed on, the nature of the color, the pressure, tension, etc. The reason why the relief printing looks embossed is due to the fact that the color at the edges all around of the depressed and cut-out portions is, as it were, picked up in a gradual curve.

The above described apparatus, is also suitable for varnishing, coating, proofing, gluing, padding, spreading, making sheets, etc., as, for instance, rubberizing fabrics, coating fabrics with various dopes, or paper with color, varnishing with varnish, or even pyroxyline, padding fabrics with starch, making sheets of celluloid, gelatine and like substances, etc.

In all the known methods of the above processes of a similar nature, either a doctor or a cylinder (like A but revolving in the opposite direction to B) is used. If the color or dope, etc. is of a quick-drying nature, the film or coating will not remain of the same thickness as at the start and will also lose in smoothness and become mottled, etc. In the case of the doctor arrangement these drawbacks are traceable to the fact that the color or dope begins caking and building up, etc. and this caking in turn causes the space between the doctor and the pattern-cylinder to become narrower and rugged. In the case of the cylinder arrangement, since the two cylinders revolve in opposite directions, the spreading medium at the line of contact is pulled by both the cylinders and as a result the said medium bridges across between the two cylinders causing ridges and a mottled surface of the film. (It will be understood that if the cylinder A were kept stationary, the space referred to would become narrower because of the caking of the spreading medium at the line of contact and the cylinder would not be superior to the usual doctor, for flats would form on it. In other words, the cylinder arrangement would lose all its value and prove itself as inferior as the doctor arrangement).

By my new method, a uniform, even and smooth film is obtained, because (1) the space referred to between the two cylinders

A and B always remains the same, i. e., its size does not increase and (2) the spreading material cannot bridge between the two cylinders thus causing the mottled uneven surface on the film. I achieve these results by rotating the cylinders A and B in the same direction so that each succeeding line of contact on the cylinder A is a clean line (i. e. without any spreading material on it) which method of rotating prevents the space from growing narrower and bridges from forming across the two cylinders, thereby giving rise to the mottled uneven surface on the film above referred to.

The speed at which the cylinder A revolves is considerably less than that of the cylinder B, the main idea being just to present at the line of contact continuously a fresh, clean surface. The speed will also depend upon the nature of the color or dope, requiring more or less scraping.

The method of varnishing or the like is the same as described above, except that the printing color is replaced by either varnish, or dope, or the like. When the material to be varnished or covered with dope, etc. is hard like paper, it is preferable to use either the cylinder B of hard rubber, or if of metal to cover it with very thin rubber sheet. This slight resiliency will give superior results. No such resiliency, however, is necessary when the dope itself is to be turned into sheets. In that case it is helpful to pass around the cylinder B an endless band G of metal, celluloid, or the like and of suitable length so as to obtain time sufficient to dry the dope sheet. To prevent the band from slipping on the cylinder B the latter may be covered with some thin resilient material. If it is desired to obtain a relief effect combined with varnishing, coating or the like, it is simply a matter of mounting on the cylinder B a pliable pattern over which passes the material to be varnished.

When a material shall be varnished, impregnated or otherwise treated on both sides, the material is passed between the two cylinders A and B in a substantially straight line, as shown in Fig. 2 and in broken lines in Fig. 1. In that case, the varnish, or other substance, rests against both sides of the material, the two sides of the material together with the said cylinders forming boxes which hold the varnish or other substance. The material thus being passed between the two cylinders A and B will be treated on both sides.

It will now be clear that, so far as the invention herein is concerned, the different operations of printing, printing in relief, varnishing, coating, spreading or the like are all the same, since the method of obtaining these different results by the process described above is in principle the same, the difference in the different effects being ob-

tained by the suitable manipulation of the pattern, the kind of material to be printed on, the color, varnish or the like, the pressure, the tension, the speed of A, etc.

Successful results can also be obtained from engraved metal cylinders (the rubber or resilient engraved cylinder being in effect almost the same as cylinder B with the resilient pattern mounted on it), provided, however, that the material to be printed on supplies the resiliency necessary for the successful operation of this process. In other words, this process does not aim at securing successful results, say, by the use of a metal engraved cylinder and a hard printing paper, for there is no resiliency in either of them. If however, a rubberized sheet is used instead of the paper, the result is more successful; since the resiliency necessary to make up for the slight unevenness in the two cylinders and the material to be printed on is supplied by this rubberized sheet. It also helps to scrape off the color more effectively from the raised portions, and to leave sufficient color in the depressed portions which form with greater ease on account of the elasticity in the rubberized fabric.

Where repeats are longer than the circumference of the cylinder B, an endless pattern band in place of the band G, such as described in my pending application No. 670,831 may be used.

When the cylinders A and B are very wide, to avoid the spring in them, they may be backed up with other cylinders as done in the photogravure machine.

I claim as my invention:

1. The process of printing and printing in relief on cloth, paper or other materials, which consists in passing under pressure the material to be printed on together with the color riding on the said material between two relatively adjustable cylinders, viz, a rotatable cylinder adapted to support a pliable pattern, and a second smooth rotatable cylinder in contact with the said color, and revolving the said two cylinders relatively to each other in the same direction but revolving the said second cylinder more slowly than the former, so as to scrape off the color from the raised portions of the material to be printed on while leaving it more or less in the depressed portions according to the varying relief of the original pliable pattern, thereby producing a print corresponding in design to the reverse of the said original pattern and in color graded in tone also reverse to the variation in relief of the said original pattern.

2. The process of printing and printing in relief on cloth, paper or other materials, which consists in passing under pressure the material to be printed on together with the color riding on the said material between two

relatively adjustable cylinders, viz, a smooth rotatable cylinder adapted to support a pliable pattern, and a second smooth rotatable cylinder in contact with the said color and revolving the said two cylinders relatively to each other, so as to scrape off the color from the raised portions of the material to be printed on while leaving it more or less in the depressed portions according to the varying relief of the original pliable pattern, thereby producing a print corresponding in design to the reverse of the said original pattern and in color graded in tone also reverse to the variation in relief of the said original pattern.

3. The process of varnishing, gluing and the like, which consists in passing under suitable pressure the material to be varnished together with the varnish riding on the said material between two relatively adjustable cylinders, viz, a smooth rotatable cylinder and a second smooth rotatable cylinder in contact with the said varnish, revolving the said two cylinders relatively to each other in the same direction but revolving the said second cylinder more slowly than the said first cylinder, so as to spread the varnish on the material to be varnished in any desired thickness of the film.

4. The process of spreading, which consists in passing under suitable pressure the material to be spread between two smooth rotatable cylinders adjustable relative to each other, and revolving them in the same direction but one of them more slowly than the other so as to spread the spreading material in any desired thickness.

5. The process of printing as specified in claim 1, in which an endless pattern-band is passed loosely around the pattern supporting cylinder, and the material to be printed on is fed between the said two cylinders.

6. The process for varnishing, coating, gluing or otherwise treating paper, cloth or the like simultaneously on both sides, which consists in passing the material to be treated between two relatively adjustable cylinders revolving in the same direction, a doctor cooperating with one of the said cylinders, and holding the varnish, etc. between each of the said two cylinders and the material to be treated while permitting the varnish etc. to rest directly against both sides of the material to be treated.

7. The process as specified in claim 4, in which an endless band is passed loosely around the more rapidly revolving cylinder, the material to be treated being fed between the said band and the other of the said cylinders.

In testimony whereof I affix my signature.

JEHANGIR MANECKJI COOPER.