

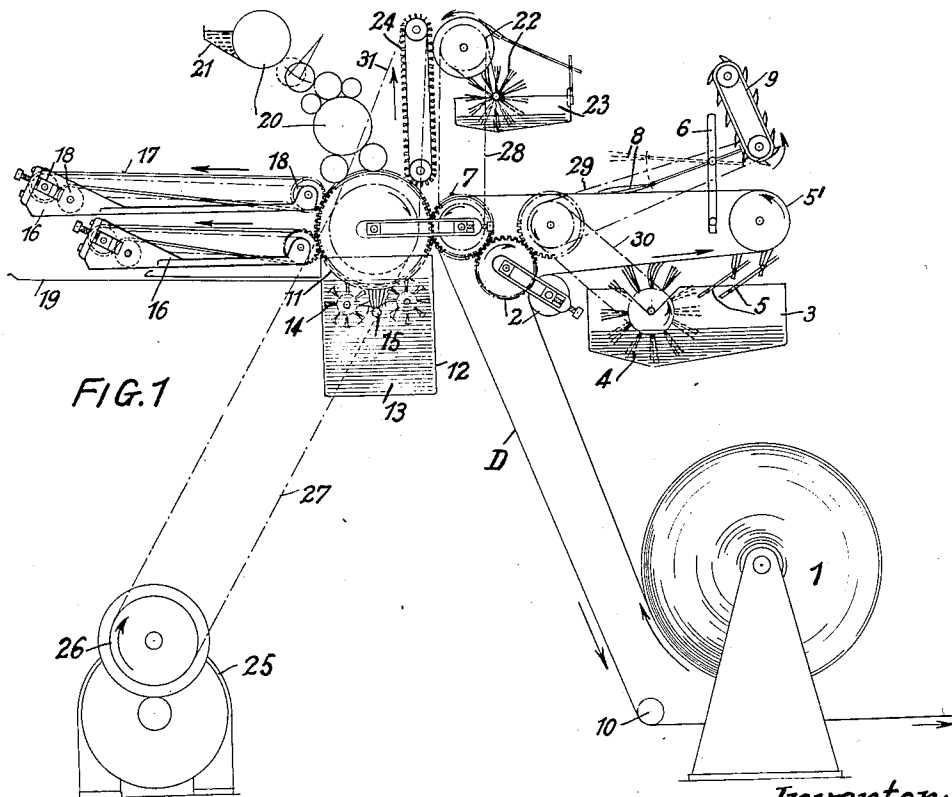
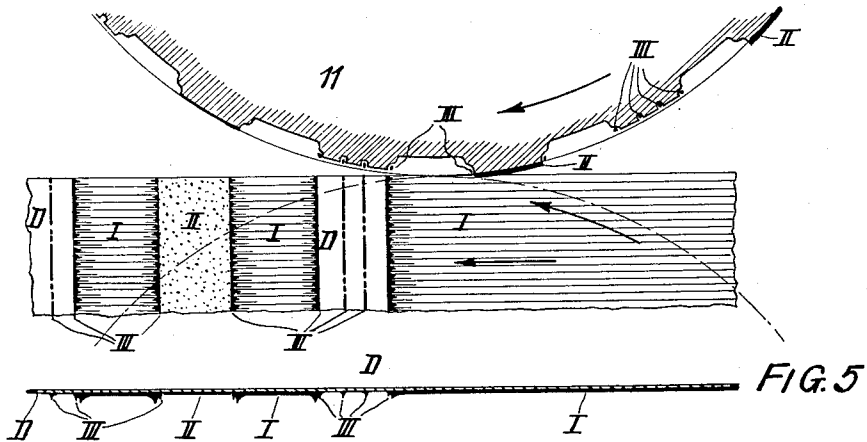
Nov. 8, 1932.

W. SCHWABE
PRINTING DEVICE

1,886,597

Filed Oct. 3, 1929

2 Sheets-Sheet 1



Inventor:
Walter Schwabe
by *Henry Orth*
att'y

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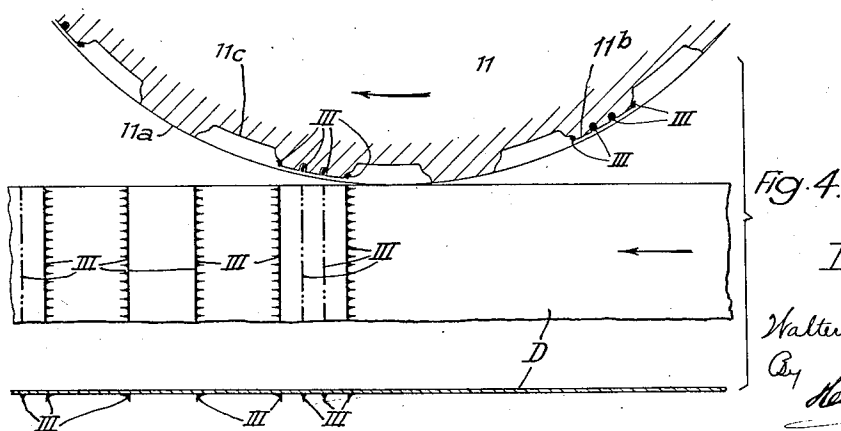
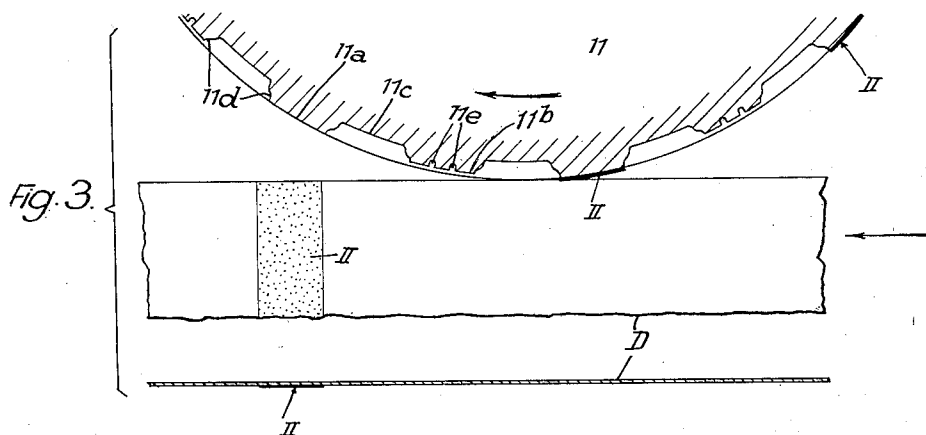
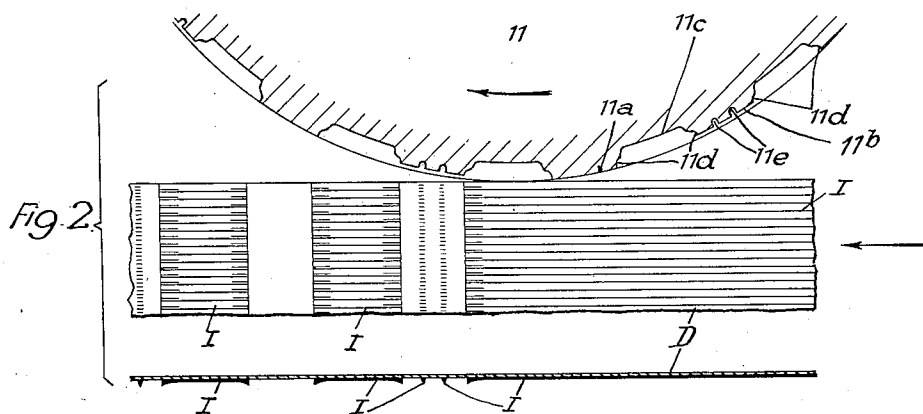
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2 Sheets-Sheet 2



Inventor:

Walter Schwabe

By *Henry Orth Jr.*

Atty.

UNITED STATES PATENT OFFICE

WALTER SCHWABE, OF ZURICH, SWITZERLAND

PRINTING DEVICE

Application filed October 3, 1929, Serial No. 397,058, and in Germany October 12, 1928.

The present invention relates to a method and a device for imprinting a running web-shaped surface by squeezing off a viscous colouring substance which is uniformly applied to the web, in certain places thereof, by means of a hard cylindrical printing form with relief surface for pressing the web against an elastic counter drum.

The methods of this kind, heretofore known, enabled printing in one colour only, whereby, relatively dead, monotonous designs were produced which were good enough to be used for cheap wall paper but not for artistic decorative purposes such as for fine ornamental papers and the like.

The purposes of the present invention is to overcome this drawback by a method which consists in uniformly applying to the web an initial colour in the form of a viscous colouring substance, squeezing said colouring substance subsequently off the web in certain places thereof, and applying another colouring substance of different characteristics in regard to solubility, to the surface, in the places where the previously applied colouring substance is squeezed off. (The designation "different characteristics in regard to solubility" is intended to express that a colour is not soluble in the same solvent as another colour which is applied at the same time, but only in a different solvent so that during the printing, the two colours do not mix or flow into one another).

Owing to this method high grade two colour printings are effectuable in one simple operation by means of a single printing form in the shape of a printing cylinder which printings are superior to the products of this type, heretofore known, in every respect as far as their artistic effect is concerned.

Furthermore, a third colour can be imprinted in the same operation in that a third colour is applied to the printing cylinder by means of a brush, suchwise that it remains deposited only at the edges of the recessed portions of

the impression cylinder and in narrow engraved lines. In this manner contours on the coloured surfaces of the printed picture as well as lines in the same are produced.

One manner of carrying the method into effect is hereinafter described with reference to the drawings in which one form of a device adapted for this purpose is illustrated.

Fig. 1 of the drawings shows schematically an elevation of a printing machine;

Fig. 2 is a fragmentary section of the surface of the printing cylinder including a part of the printing pattern produced thereby, in plan, without inking the impression cylinder.

Fig. 3 is a like view with the paper D not inked and the high parts only of the impression cylinder inked with a fatty ink;

Fig. 4 is a view showing the impression of both high and low portions of the impression cylinder when inked with color III, a water color, on an un-inked web;

Fig. 5 is a like view showing the impression on an inked web by the high portions of the impression cylinder inked with a fatty ink and the low portions inked with water color.

In performing the method, the web to which a viscous colouring mass a thick water color is uniformly applied is passed between the mechanically rotated cylindrical impression cylinder and an elastic counter-drum 7, for instance, a rubber cylinder, whereby, the coating of colouring substance applied to the web is squeezed off the latter in all places of contact with the surface of the impression cylinder. This operation can be effected by means of the machine illustrated in Fig. 1 of which only the parts are shown which are absolutely necessary for a good understanding of the invention. In this figure, 1 represents the supply roll of the web B to be printed, and 2 are guide or driving rollers for the latter respectively. 3 is an inking device which by means of an inking brush 4 applies

colouring ink such as a heavy water color to the surface of the web D, any excess of colouring ink is removed by brushes or scrapers 5 and induced to flow back in the trough 3. 5' designates a roller for changing the direction of the web so as to lead it to the counter-drum 7. On this portion of the path of the web a brush device 6 for uniformly spreading the color thereover is arranged. The device 6 includes brushes 8 which are alternately moved into contact with the web D by means of a running belt 9 provided with cam portions, whereby, a uniform distribution of the heavy colouring substance on the web D is effected. From the counter-drum 7 the web D is deflected downwards to pass over a guide roller 10 to a drying appliance not shown. Alongside of the counter drum 7 the printing cylinder 11 is mounted which is provided with the printing surfaces 11a and 11b of different heights. The printing surface 11a is slightly higher than the surface 11b. At the edges of both printing surfaces 11a and 11b there are small offset portions 11c and in the lower surface 11b there are provided grooves 11e, the purposes of which will be described below. This printing cylinder is immersed with the lower part of its circumference in a wash tub 12 which contains a solvent 13 as well as a cleaning device 14, 15. 14 designates circular brushes for cleaning the printing cylinder 11 from all other colour remnants than those of the colouring substance which is applied to the high portions of the surface of the printing form, for the purpose hereinafter described, which latter colouring substance for example a fatty or lithographic ink is not soluble in the liquid contained in the wash tub 12 with which the printing cylinder is flushed by the spray pipe 15.

In the direction of rotation of the printing cylinder (as indicated by the arrow in Fig. 1) several other devices are arranged around the said cylinder, such as drying devices 16 wherein in a manner known per se a flexible band 17 adapted to be soaked with the liquid 13 is movably arranged on rollers 18 mounted in a removable frame on a tray-shaped bottom plate 19 for receiving liquid dripping from the pair of squeezing rollers 18 at the outer end of the band 17 when the latter passes between the said pair of rollers which are resiliently pressed against each other. The drying devices 16 are arranged in pairs so as to permit one of the same to be cleaned at a time without interrupting the operation of the machine. The printing form leaves the band 17 in dry and clean condition and the liquid which was removed therefrom flows back from the tray 19 into the wash tub 12.

Furthermore, an inking train 20 for the fatty ink is arranged which also in a manner

known per se is adapted to convey colouring substance from the trough 21, by means of intermediary rollers to the high portions 11a of the printing cylinder 11. A second inking device 22 also in a manner known per se serves for applying a further colouring substance a thin water colour to the printing low portions 11b of the form by means of moving brushes 24 which color or ink is repelled by and does not adhere to the previously inked high portions having the fatty ink thereon.

With this machine the printing operation is as follows:

The web D and the cylindrical printing form 11 are mechanically turned by a motor 25 from a drum 26 by means of a belt or chain 27 and toothed rims which are provided on the circumference of the drums 2, 7 and 11, in the direction of the arrows and the rotation of the motor 25 is transmitted to the devices 22, 6, 4 and 24 in similar manner by belts or chains 28, 29, 30 and 31. The portion of the circumference of the cylindrical printing form 11 which is immersed in the tub 12 is cleaned therein by the aid of the cleaning device 14, 15 from water colour remnants but not the fatty colour II (see Fig. 1) still adhering to the said form after the printing operation at the zone of contact between the drums 7 and 11, and by means of one of the drying devices 16 the whole printing surface is dried.

Then a fatty ink II is applied to the high portions 11a of the printing form by means of the colouring device or inking train 20 which substance has different characteristics in regard to solubility than the colouring substances I and III which latter is fairly light-flowing and is applied to the edges 11c of the recessed portions of the printing form and to grooves 11e in the surface 11b of depressions of minor depth in the said form, if such grooves be provided. When the high portions of the printing form come into contact with the web D while the same, which previously was inked in with the viscous colouring substance I, passes the counter-drum 7 the said portions squeeze the said colouring substance from the corresponding parts of the web, and imprint the said parts with the colouring substance II. Recessed or low parts 11b of minor depth of the printing form which, for instance, are 0.5 mm below its surface, obviously, due to the resiliency of the counter-drum also squeeze the colouring substance I, from the corresponding places of the web but as they previously were not inked in with the colouring substance II, the initial colour of the web surface re-appears in the said places. The colouring substance I which was squeezed off, partly passes to the recessed portions of the printing form, but the main part of it is urged towards the edge portions thereof so that, in consequence of the massed colouring substance thereat, dark por-

tions are produced in the respective coloured surfaces of the web which give the latter surfaces a relief-like aspect. At the same time the dark colour III applied with a brush to the printing form is imprinted on the same so that the said colour forms dark contours on the said coloured surfaces and lines on the web in case of grooves corresponding to these lines are provided in the printing form. A flowing into one another or mixing of the amassed colouring substances I and II will thereby not take place, as the colouring substances I and II have different characteristics of solubility. The running web then passes over the drum 10 to the drying appliance, whilst the portion of the cylindrical printing form immersed in the wash tub 12 is again cleaned and subsequently again inked in.

In order to make the manner in which the printing is effected still clearer, Fig. 2—5 shows, on a larger scale, a fragment of a section through the cylindrical printing form 11 and a plan view of the printed image on the printing web produced therewith. For the sake of simplicity of illustrating and explaining, a pattern with simple transverse strips was chosen but, obviously, every suitable design or picture may be printed in this manner including pictures with inscriptions. The chain line in this figure indicates the circumference of the counter-drum 7 cooperating with the printing cylinder 11. Fig. 5 shows in longitudinal section with the thickness of the coating of the colouring substance exaggerated, how the latter is applied to the printing web immediately after the printing.

I claim:

1. A method of imprinting a running web-shaped surface, comprising uniformly applying to the surface an initial colour in the form of a viscous colouring substance, squeezing said colouring substance subsequently off the web in certain places thereof, and applying another non-miscible colouring substance, in the places where the previously applied colouring substance is squeezed off.

2. A method of imprinting a running web-shaped surface, comprising uniformly applying to the surface an initial colour in the form of a viscous colouring substance, squeezing said initial colouring substance subsequently off the web in certain places thereof, simultaneously applying another colouring substance non-miscible with the viscous colouring substance to the surface, in the places where the previously applied initial colouring substance is squeezed off, and applying a further colouring substance non-miscible with said other coloring substance to the surface, to provide contours on the coloured surfaces of the web by the further colouring substance.

3. In a device for imprinting a running web-shaped surface, in combination, a central cylindrical printing form having high

impressing portions in its circumference, said printing form being rotatably mounted in its centre, a counter-drum of resilient material cooperating with the said printing form, means adapted to press said printing form and said counter-drum against each other, means for rotating the said cylindrical printing form and the said counter-drum in opposite directions, means to guide the running web-shaped surface to pass between the said printing form and the said counter-drum, means for uniformly applying a colouring substance to the said printing web, means for applying another colouring substance to the high portions of the said printing form, said other colouring substance having different characteristics in regard to solubility than the colouring substance applied to the printing web, so that in the zone of contact between the printing form and the counter-drum the high portions of the printing form squeeze off the colouring substance on the printing web at the corresponding portions thereof in order to imprint the same with the colouring substance on the high portions of the printing form.

4. In a device for imprinting a running web-shaped surface, in combination, a central cylindrical printing form provided with recessed portions in its circumference, said printing form being rotatably mounted in its centre, a counter-drum of resilient material cooperating with the said printing form, means adapted to press said printing form and said counter-drum against each other, means for rotating the said cylindrical printing form and the said counter-drum in opposite directions, means to guide the running, web-shaped surface to pass between the said printing form and the said counter-drum, means for uniformly applying a colouring substance to the said printing web, means for applying another colouring substance to portions of the said printing form, said other colouring substance having different characteristics in regard to solubility than the colouring substance applied to the printing web, washing means to remove colour remnants from the printing form at each revolution of the printing form and means to dry the cleaned surface of the printing form previous to applying colour to it.

5. The method of printing which comprises surfacing a strip of moving paper with ink and squeezing such ink off the paper at portions thereof with a printing form inked with an ink non-miscible with the first mentioned ink to cause the non-miscible ink to be impressed on the paper.

6. The method of printing which comprises surfacing a moving strip of paper with ink, inking an impression cylinder with non-miscible inks and squeezing the ink off of said paper by said cylinder to imprint the non-miscible inks on the paper.

7. In a device for printing a multicolored design on a flexible surface, a rotatable cylindrical printing form having raised portions of different heights on its circumference, means for applying an initial coloring substance on the flexible surface, means for applying different coloring substances on the different heights of raised portions of the printing form, and means for simultaneously squeezing off part of said initial coloring substance from the flexible surface and applying the coloring substances on the printing form onto said flexible surface.

In testimony whereof I have signed my name to this specification.

WALTER SCHWABE.

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