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(54) **ROTOGRAVURE PRINTING APPARATUS**

TIEFDRUCKVORRICHTUNG

APPAREIL D'IMPRESSION PAR ROTOGRAVURE

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Description

TECHNICAL FIELD

[0001] The present invention is related to a double ender rotogravure printing apparatus according to the pre-characterizing portion of claim 1.

BACKGROUND OF THE INVENTION

[0002] GB 01977 discloses an arrangement where two printing units, each comprising an intaglio cylinder, are put in parallel to each other. These known printing units are printing on the whole width of the paper and not twice on half of the width of the paper as is the case at an Double Ender. GB 2102 737 discloses a web-fed rotary printing machine, and a method for continuous printing where the part-width web can be printed continuously along its length, i.e. without interruptions (gaps) in the printed matter which is typical for web-offset printing. A gravure printing cylinder has no gaps and the web may be printed continuously along its length without any interruptions. There are on the world market two rotogravure engraving technologies, on one hand, a mechanical engraving apparatus available from the firm Hell Gravure Systems, and, on the other hand, a laser engraving apparatus available from the firm Max Daetwyler AG, see also EP 1 333 976 B1 and JP2001105166. Furthermore, there are two rotogravure printing apparatus manufacturers, viz. on one hand KBA AG and, on the other hand, OMG Cerutti SpA. Such an apparatus is defined in pre-characterizing portion of Claim 1.

[0003] The known engraving apparatuses are used in conjunction with the current standard eight unit publication rotogravure apparatuses of various widths from the above mentioned manufacturers. Since the middle of the 1990's, standard eight unit publication rotogravure apparatus have been automated and with much higher speeds than before, and the apparatuses from these two companies have similar performance. In 2007, the situation has developed so that due to the long production schedules of producing eight cylinders (each such cylinder is to be mounted in each one of the units of the printing apparatus) the minimum average achievable print run and number of pages have increased substantially since the beginning of the 1990's, leaving the market for smaller and medium print runs to competing printing technologies. The above mentioned apparatuses can not, due to economical and technical constraints, be used for short runs.

OBJECT OF THE INVENTION

[0004] The object of the invention is to provide a solution overcoming the drawback of the known gravure printing technology in printing short runs and with signatures containing 16 to 64 pages and to decrease the average minimum print runs with signatures containing 16 up to

64 pages which are technically and economically feasible to achieve when using the rotogravure printing method.

[0005] Another object of the invention is to provide a solution which is highly automated as to its function which minimizes the need for staffing.

[0006] Furthermore, the solution must be reliable, cost efficient and easy to use in order to minimize the above mentioned constraints.

10 SUMMARY OF THE INVENTION

[0007] The above objects are achieved by means of a rotogravure printing apparatus according to claim 1.

[0008] Using standard engraving and printing apparatus in rotogravure, the minimum average print runs (for 32-48-64 pages) is above 500 000 copies. The invention makes it feasible to substantially reduce the minimum average print run (well below 100 000 copies of products containing 16-64 pages in A4 format), and make rotogravure printing competitive on such products and markets where such products are in demand. To economically produce such products (16-64 pages) with low average print runs has not been technically and economically feasible since the end of 1970's, when the previous manual etching methods were replaced by mechanical engraving. These methods were analogue and can not be used today when all data received from customers is digital for manufacture of engraved cylinders. In the future, when faster laser technology is available even shorter runs will be possible to print - technically as well as economically.

[0009] The cylinders of the double ender printing apparatus according to the invention has a width of 130-380 cm with four units allowing the production of products from 16 to 64 pages in four colours on each side of the printed paper substrate. Although the said direct laser engraved cylinders are preferred, allowing the lowest average print runs, alternatively also mechanical engraved cylinders may be used.

[0010] The said apparatus according to invention has the same performance as a standard eight unit rotogravure printing apparatus.

[0011] The sub claims define preferred embodiments of the invention.

45 BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The invention will be described in closer detail in the following by way of preferred embodiments thereof with reference to the annexed drawings.

Fig. 1 is a side view of a double ender rotogravure printing apparatus according to the invention, where several parts of the printing apparatus are deleted for clarity.

Fig. 2 is a sectional view of the double ender apparatus in Fig. 1 along the line II - II in Fig. 2.

Fig. 3 is a schematical top view of a second embodiment of a double ender apparatus according to the invention where further parts of the printing apparatus are deleted for more clarity.

Fig. 4 is a cross-sectional of the cavities in cylinders used in double ender apparatus in Fig. 1.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0013] Figs. 1-2 illustrates a first embodiment of a double ender rotogravure printing apparatus 1 according to the invention.

[0014] The double ender printing apparatus 1 comprises a folder 2, printing units 3, a turning bar device 4, an unwinder 5, a main drive 6 for the printing units 3 and devices 7 for loading/unloading of cylinders 8 into the printing units 3.

[0015] In this embodiment, the double ender printing apparatus 1 consists of five units, but at least four must be used in such an apparatus, and uses a continuous paper web 9 having two main printing passes which are substantially parallel to each other and each extends over a part of each half of each cylinder 8. The cylinder 8 is used to print the recto side, then the web 9 is turned twice by means of the turning bars 4 to print the verso side (wiederdruck) on the other half of the cylinder 8. The proposed rotogravure printing apparatus 1 is designed only for double ender printing.

[0016] Fig. 3 shows a second embodiment of a double ender apparatus 20 according to the invention comprising a folder 21, four printing units (not shown), turning bars 22, an unwinder 23, a main drive (not shown) for the printing units and devices (not shown) for loading/unloading of cylinders 24a, 24 into the printing units.

[0017] The apparatus has an automated device for webbing up the web 25. The continuous paper web 25 starts at the unwinder 23 and runs to the folder 21 of the double ender apparatus 20 and passes through four printing units (print cylinder 24) to print the recto side 25a of the web 25; the web 25 is then turned twice 45 degrees at the turning bars 22. The web 25 is then turned upside down and goes thereafter back to the first cylinder 24a. Further, the web 25 passes through the four printing units (print cylinders 24, 24a) to print the verso side 25b "wiederdruck" of the paper web 25 and into the folder 21, to the right in Fig. 3. In order to obtain perfect colour register, the paper web 25 can be moved independently in lateral and longitudinal directions shown by means of arrows 26 and 27, respectively, when passing through each printing unit in recto "schön" and verso "wieder".

[0018] In a double ender rotogravure printing apparatus with five units the fifth unit could be used for lacquer (printing covers for magazines), any special ink demanded or to produce very few pages (8-16 pages) for versioning/zoning editions (when the text cylinders for black text needs to be changed very quickly).

[0019] Figure 4 shows a metal surface 40 of cylinders

8 and 24a, 24 of the double ender rotogravure printing apparatuses 1 and 20, respectively. The metal surface 40 of cylinders 8, 24a, 24 is engraved in a laser engraving apparatus (not shown) with high speed and producing at least two rotogravure printing cylinders per hour. The laser engraving apparatus engraves cavities (cells) 41 which are generated on the metal surface 40 for rotogravure printing in the double ender printing apparatuses 1 and 20.

[0020] The structure of the metal surface 40 which is preferably used generates "Superhalfautotypical" cavities (cells) 42, which allows printing on many different paper substrates.

[0021] It should be noted that the double ender rotogravure printing apparatus 1 and 20 according to the invention is not limited to the above described embodiments, but could be modified within the scope of the appended claims.

Claims

1. A rotogravure printing apparatus comprising an unwinder (5), at least four printing units (3, 24a, 24) each having a cylinder (8), a continuous paper web path (9) and a folding device (2, 21), **characterized in that** the apparatus is a "Double Ender" rotogravure printing apparatus (1, 20) having two main printing parts (25a, 25b), which apparatus extends substantially parallel to each other, each of said printing units (3, 24a, 24) extending over a portion of said main printing parts (25 a, 25b) of said web path (25), each main printing part (25a, 25b) being provided to print on laterally different sides of each printing cylinder (8), and **in that** said printing cylinder (8) is engraved by means of direct laser engraving device with high speed (Direct Engraving laser) producing at least two rotogravure printing cylinders per hour.
2. Apparatus according to claim 1, **characterized in that** said cylinders each have a width of 130-380 cm, preferably about 250-270 cm.
3. Apparatus according to claim 1, **characterized in that** each part (25 a, 25 b) of said printed web path (25) shall have a separate device to guide said web independently when printing in recto, "schön", and verso, "wider".
4. Apparatus according to claim 1, **characterized in that** having at least four printing units (3) or one or two extra printing units (3) for special products.
5. Apparatus according to claim 1, **characterized in that** each printing unit (3) has a device (7) for automated load/unloading of said rotogravure cylinders (8).

6. Apparatus according to claim 1, **characterized in that** said apparatus shall have an equipment for automatic webbing of the paper web (25).

7. Apparatus according to claim 1, **characterized in that** each printing cylinders (8) is engraved with cavities (cells) (41) provided in the metal surface (40).

Patentansprüche

1. Eine Druckmaschine mit Rotationstiefdruck, bestehend aus einem Bandlaufwerk (5), mindestens vier Druckwerken (3, 24 a, 24), jedes mit einem Zylinder (8), einer kontinuierlichen Bahn für das Papierband (9) und einem Gerät (1, 20) für das Falzen (2, 21), **dadurch gekennzeichnet, dass** das Gerät ein Rotationstiefdruckgerät mit zwei Enden ist, das zwei Hauptdruckelementen (25 a, 25 b) hat, die sich jeweils hauptsächlich parallel zueinander erstreckt, wobei jedes Druckwerk (3, 24 a, 24) sich über einem Teil der genannten Hauptdruckelemente (25 a, 25 b) des genannten Bands (25) erstreckt, wobei jedes Hauptdruckelement (25 a, 25 b) dem Druck auf jedem seitenverschiedenen Druckzylinder (8) angeordnet ist, und dass der Druckzylinder (8) mittels des Geräts für direkten Hochgeschwindigkeitslaser (Direct Engraving laser) graviert wird, das mindestens zwei Druckzylinder mit Rotationstiefdruck pro Stunde produziert .
2. Maschine nach Anspruch 1, **dadurch gekennzeichnet, dass** jeder Zylinder 130 bis 180 cm, vorzugsweise etwa 250 bis 270 cm, breit ist.
3. Maschine nach Anspruch 1, **dadurch gekennzeichnet, dass** jedes Element (25 a, 25 b) der genannten Druckbahn (25) des Bandes mit einer separaten Vorrichtung versehen ist, um das genannte Band unabhängig zu führen, wenn auf der Vorderseite "richtig" und auf der Rückseite "erneut" gedruckt wird.
4. Maschine nach Anspruch 1, **dadurch gekennzeichnet, dass** diese mindestens vier Druckeinheiten (3) oder eine oder zwei zusätzliche Druckeinheiten (3) für spezielle Produkte hat.
5. Maschine nach Anspruch 1, **dadurch gekennzeichnet, dass** jede Einheit (3) eine Vorrichtung (7) für das automatisierte Laden/Entladen der genannten Tiefdruckzylinder (8) hat.
6. Maschine nach Anspruch 1, **dadurch gekennzeichnet, dass** die genannte Maschine mit einer Ausrüstung versehen sein muss, um das Papierband (25) automatisch anzufügen.

7. Maschine nach Anspruch 1, **dadurch gekennzeichnet, dass** jeder Druckzylinder (8) mit in der Oberfläche des Metalls (40) vorgesehenen Hohlräumen 41 (cells) graviert wird.

Revendications

1. Une machine d'impression par heliogravure comprenant un dérouleur (5), au moins quatre unités (3, 24a, 24) d'impression, chacune ayant un cylindre (8), un chemin (9) de bande continue de papier et un dispositif (2,21) pour le pliage, caractérisée de sorte que l'appareil est un appareil (1, 20) d'impression par heliogravure à double extrémité (Double Ender) ayant deux éléments (25a, 25b) d'impression principaux s'étendant substantiellement parallèlement l'une à l'autre, chacune desdites unités (3, 24a, 24) d'impression s'étendant sur une partie desdits éléments (25a, 25b) d'impression principaux de ladite bande (25), chaque élément (25a, 25b) d'impression principal étant prévu pour l'impression sur les côtés latéralement différents de chaque cylindre (8) d'impression et de sorte que ledit cylindre (8) d'impression est gravé au moyen du dispositif de gravure laser direct à grande vitesse (Direct Engraving laser), produisant au moins deux cylindres d'impression par heliogravure par heure.
2. Machine selon la revendication 1, caractérisée de sorte que chaque cylindre a une largeur de 130 à 180 cm, de préférence environ 250 à 270 cm.
3. Machine selon la revendication 1, caractérisée de sorte que chaque élément (25a, 25b) dudit chemin (25) d'impression de la bande a un dispositif séparé pour guider ladite bande indépendamment en imprimant au recto, «bien» et au verso «à nouveau».
4. Machine selon la revendication 1, caractérisée de sorte qu'elle a au moins quatre unités (3) d'impression, ou une ou deux unités d'impression supplémentaires (3), ou une ou deux unités (3) d'impression supplémentaires pour les produits spéciaux.
5. Machine selon la revendication 1, caractérisée de sorte que chaque unité (3) d'impression a un dispositif (7) pour la charge/décharge automatisée desdits cylindres (8) de heliogravure.
6. Machine selon la revendication 1, caractérisée de sorte que ladite machine doit avoir un équipement pour attacher automatiquement la bande (25) de papier.
7. Machine selon la revendication 1, caractérisée de sorte que chaque cylindre (8) d'impression est gravé avec des cavités (cells) (41), prévues dans la surface

(40) du métal.

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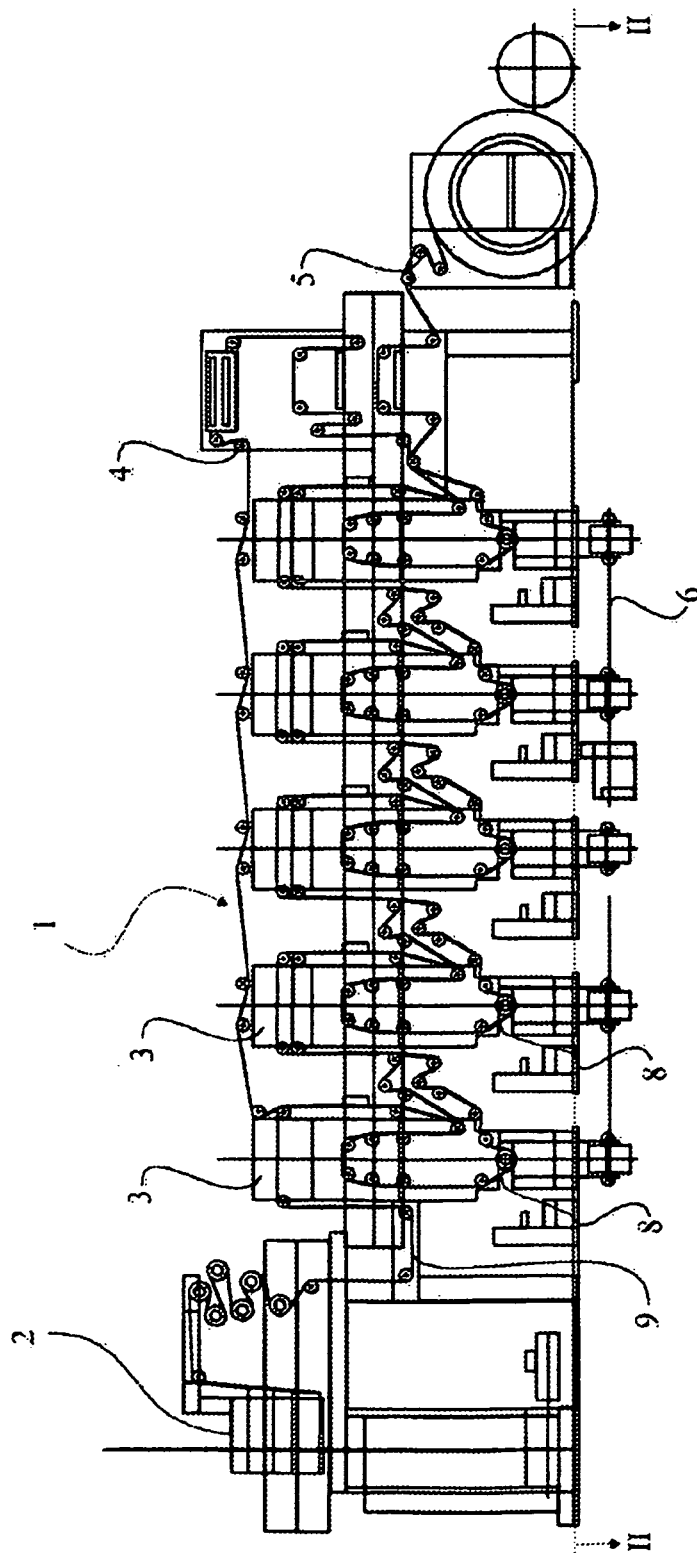


Fig. 1

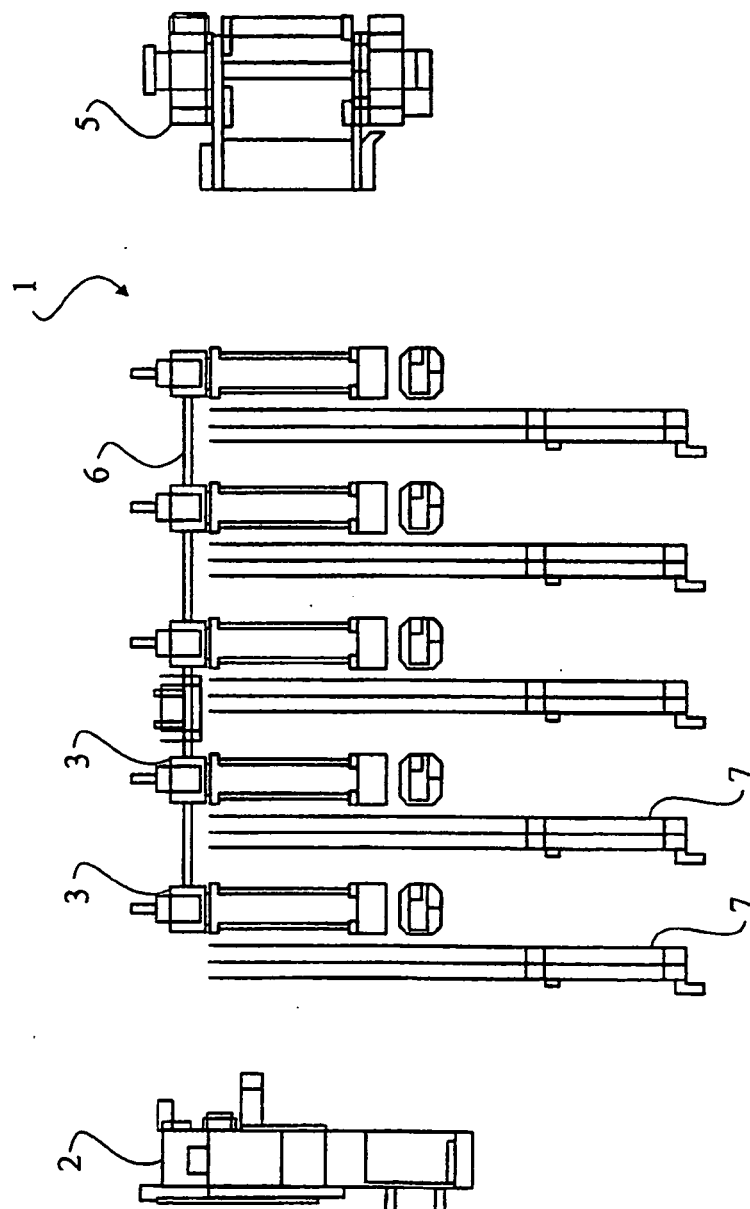


Fig. 2

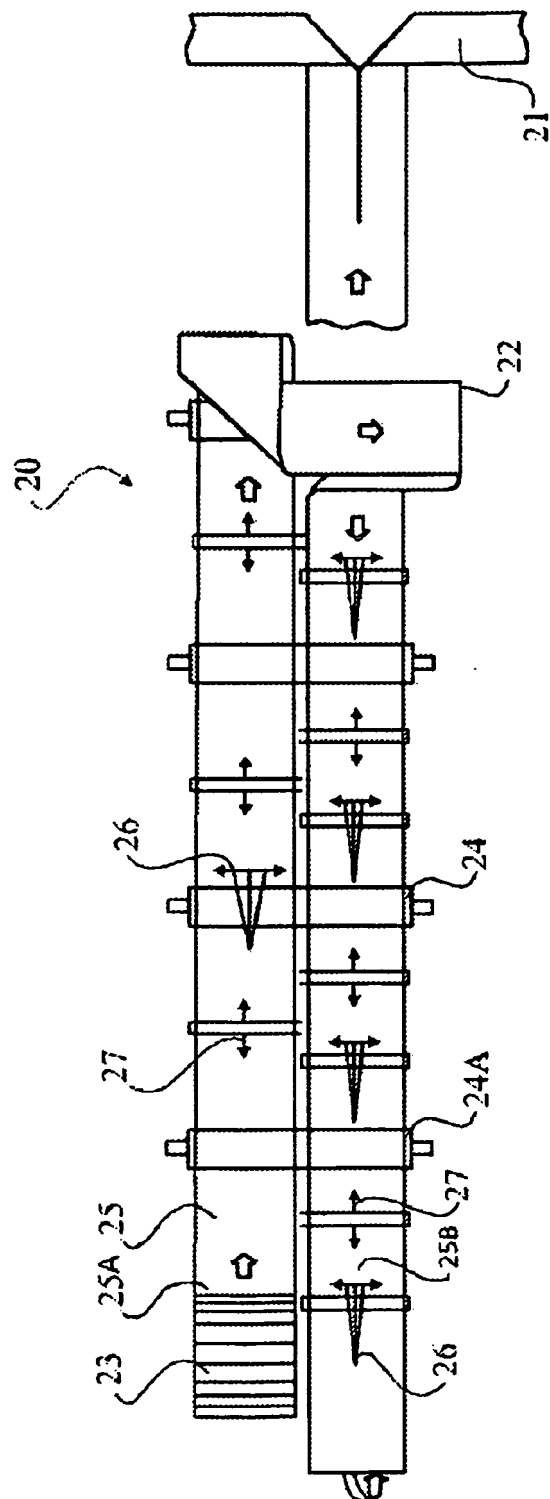


Fig. 3

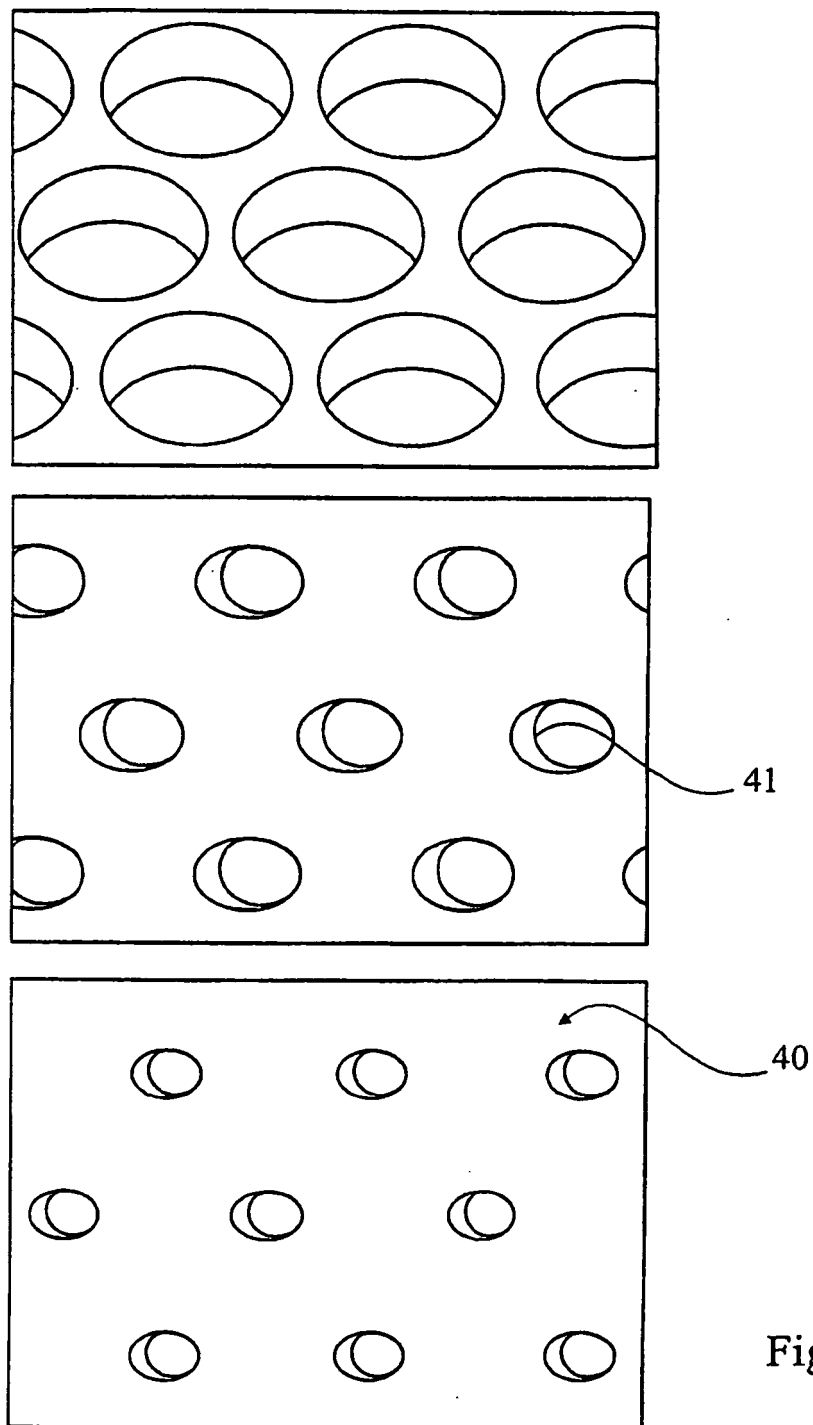


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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