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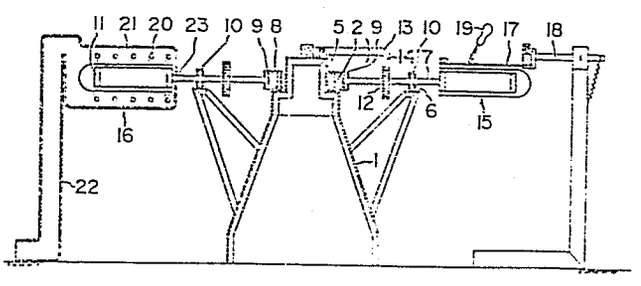
(54) **SCREEN PRINTING APPARATUS.**

(57) This apparatus is used to effect desired printing on the surface of a T-shirt or the like. A plurality of mounts, each having a T-shirt or the like mounted thereon, are movably positioned around a base, and a dryer is provided on the locus through which the mounts move. Each mount is formed of an air-permeable material.

FIG. 2



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SPECIFICATION

Screen Printing Apparatus

Technical Field

This invention relates to a screen printing apparatus for screen-printing of print materials having air-permeability such as T-shirts, clothing bags, clothing pieces, Japanese papers, felt materials etc. and simultaneously for drying them while the print materials are held on mounting plates.

Background Art

Conventionally, mounting plates of the above screen printing apparatus are made of plywood boards, aluminium plates, or stainless steel plates. Such mounting plates, however, have the following defects.

(1) Since solvents or water contained in an aqueous ink or an oil ink adhere to the mounting plates when passing the drying device (after solvents become gaseous, they condense and adhere to the mounting plates and thereby become liquid), such solvents stain the print materials set on the mounting plates. Furthermore, in case of thin print materials, the ink penetrates the material and adheres to the mounting plates. The solvents dissolve the adhered ink and similarly stain the print materials in many cases. As the mounting plate is stained, the print materials are also stained when mounting them on the mounting plate as well as removing them from the mounting plate. Additionally, in case that the proportion of

the ink face is large relative to the print face and the print material is thin, the rate of printing failure reached to 95% and therefore the printing operation is virtually impossible.

(2) When conducting the screen printing, temporary adhesives of a spray-type are used (they are adhered to the plate in the form of minute particles) to prevent the print material from lifting up by the adhesive power of the ink. Then, the solvents become liquid and adhere to the adhesives to decrease the adhesive power thereof. Furthermore, since the temporary adhesives peel off from the mounting plate, it is necessary to repeat the application of the adhesives.

(3) When conducting the screen printing, the retention heat of the mounting plate is transmitted to a print screen and an ink etc. Accordingly, as the print screen is clogged, it is necessary to clean the print screen frequently. Furthermore, the ink gradually hardens due to the retention heat of the mounting plate to cause the change of the ink density and thereby the lack of the stability of color printed on the print material. Accordingly, it is neccessary to exchange the ink frequently. This requires much labor and time.

It is an object of the present invention to dissolve such defects of the conventional art and to provide a screen printing apparatus in which the printing and drying operations can be efficiently conducted and irrespective of the area of the ink face and the thickness of the print material, the beautiful print can be obtained.

Disclosure of Invention

This invention relates to a screen printing apparatus in which a plurality of mounting plates, each of which can replaceably mount a print material thereon, are mounted on a base frame such that the mounting plates can move around the base frame in an endless manner and intermittently, that at least one drying device is disposed along a moving locus of the mounting plate, and that the mounting plate is made of the air-permeable material.

Brief Description of Drawings

Fig. 1 is a plan view of the screen printing apparatus of the present invention, Fig. 2 is a cross sectional view taken along the line I - I of Fig. 1, and Fig. 3 to Fig. 6 are transverse sectional views of the mounting plate.

Best Mode for Carrying Out the Invention

The present invention is explained in detail hereinbelow in accordance with the embodiment shown in the accompanying drawings.

Fig. 1 and Fig. 2 show the entire construction of the screen printing apparatus of the present invention. In the drawings, numeral (1) is a base frame having an elongated square frame construction. The base frame (1) is provided with sprocket wheels (3), (4) which are rotatable by a motor (not shown in the drawing) on both ends thereof for mounting an endless

chain (2) around the base frame (1). The base frame (1) also comprises an endless-chain guide rail (5) at the upper portion thereof and an elongated circular mounting-shaft guide rail (6) which encircles the outer circumference of the endless-chain guide rail (5) with a desired space. A plurality of mounting shaft (7) are connected to the endless chain (2) at a predetermined interval by means of an attachment (8) and a bearing (9). Each mounting shaft (7) has a roller (10) in the midst thereof which rolls on the guide rail (6) and is provided with a mounting plate (11) at the distal end thereof. This construction makes it possible that the intermittent drive of the sprocket wheel (3) rotates the endless chain (2) intermittently around the base frame (1) and therefore a group of mounting plates (11) also rotate intermittently around the base frame (1) by the rotation of the endless chain (2). Additionally, the base frame (1) has a mounting-plate revolving mechanism. In this embodiment, this mounting-plate revolving mechanism is constructed by fixing a pinion (12) at a place between the bearing (9) and the roller (10) and pivotally engaging the pinion (12) with a rack (14) attached on the end of a tilt arm (13) on the top of the base frame (1). Due to such construction, when the tilt arm (13) is disposed in a lower position, the pinion (12) mounted on the mounting shaft (7) engages with the rack (14) and thereby the mounting shaft (7) rotates 180 degrees to reverse the mounting plate (11). Furthermore, A printing device (15) and a drying device (16) are disposed around the periphery of the base frame (1) at desired space and at the mounting-plate stop position. As shown in the drawings, the printing device (15) comprises a print screen (17) disposed on the moving locus of the mounting plate (11) and a support

arm (18) supporting the print screen (17) tiltably. Numeral (19) is a squeeze. A plurality of drying devices (16) are also arranged similarly on the moving locus of the mounting plate (11) and each drying device (16) comprises a heating booth (21) having an infrared heater (20) therein and an exhaust duct (22) which communicates with the heating booth (21). Numeral (23) is an elongated slit formed on the inner side of the heating booth (21) and is provided for assuring the smooth movement of the mounting shaft (7).

Fig. 3 to Fig. 6 show the construction of the mounting plate (11) which characterizes the present invention. In Fig. 3, the mounting plate (11) is constructed such that a stainless net (31) (preferably 100 - 300 meshes (inches)) is mounted on both upper and lower sides of an aluminum frame (30) forming a space (a) therebetween and a cover clothing (32) having air-permeability is attached on the stainless net (31) by means of a tightening frame (33) and a heat-resistant rubber (34). Numeral (35) is an exhaust opening formed on the aluminum frame (30) and this is not necessarily required. Numeral (36) is a temporary adhering agent used in setting the print materials (40).

Furthermore, in Fig. 4, the mounting plate (11) is constructed such that open porous bodies (52) such as porous ceramic plates are mounted on the both sides of an aluminum support member (50) by means of adhering layers (51) and a cotton textile (55) is removably mounted on the surface of the open porous bodies (52) by means of tightening frames (53) and heat-resistant rubbers (54).

Still furthermore, in Fig. 5, the mounting plate (11) is constructed

such that an open porous body (61) and a cotton textile (62) are mounted only one side of a support member (60) made of plywood board, while in Fig. 6, the mounting plate (11) is constructed by mounting only an open porous body (71) on the support member (70) made of plywood board. In Fig. 5, numeral (63) is a tightening frame and numeral (64) is a heat-resistant rubber.

The operation of the print screen apparatus having the above mounting plate (11) is explained in view of Fig. 1. The print material (40) (for example, T-shirt) is set on the mounting plate (11) at a position A. The mounting plate (11) is moved to a position B along with the rotation of the endless chain (2) and a first pattern is printed on the surface of the print material (40). Subsequently, the rack (14) engages with the pinion (12) during the movement between a position C and a position D and the print material (40) is reversed 180 degrees together with the mounting plate (11). Third and fourth patterns are printed at a position D and a position E. In this printing operation, as the mounting plate (11) has substantially the air-permeability, the ink does not make the mounting plate (11) dirty and the print screen (17) is not clogged.

After completing the printing operation, the mounting plate (11) is dried successively at a position F, a position G, and a position H, and then is moved to a position I and a position J. The print material (40) is removed from the mounting plate (11) at the position J as the final product.

The present invention that has the construction and operation as mentioned above can have the following advantages.

(1) During the drying operation, since the solvents do not vaporize from not only the surface of the material but also the reverse face thereof, the solvents do not make the material dirty and expedite drying.

(2) The surface of the mounting plate comprises the stainless net or the open porous body, and therefore is lightweight and has heat-resistance. Accordingly,

(a) It is possible to dry fast and to save unnecessary energy.

(b) After the drying operation, the mounting plate is easily cooled. Even if the heat remains, as the heat energy to transmit to the print plate is small, the heat transmission does not cause the print screen to be clogged.

(3) As the solvents do not adhere to the temporary adhering agent, the temporary adhering agent do not lower its adhesive power and can be used for a long time. Accordingly, the number of the application can be reduced.

(4) As the surface of the mounting plate is porous or made of a cover clothing, the temporary adhering agent adheres well and hardly peels off. Accordingly, the number of the application can be reduced.

(5) The use of the cover clothing (for example, the cotton textile) can prevent the ink penetrated from the air-permeable print material from attaching to the mounting plate. The inexpensive covers can be replaced with new one.

WHAT WE CLAIM IS:

1. In a screen printing apparatus in which a plurality of mounting plates, each of which can replaceably mount a print material thereon, are mounted around a base frame such that said mounting plates can move around the base frame in an endless manner and intermittently and that at least one drying device is disposed along a moving locus of said mounting plates, the improvement is characterized in that said mounting plate is made of an air-permeable material.

2. In a screen printing apparatus in which a plurality of mounting plates, each of which can replaceably mount a print material thereon, are mounted around a base frame such that said mounting plates can move around the base frame in an endless manner and intermittently and that at least one drying device is disposed along a moving locus of said mounting plates, the improvement is characterized in that said mounting plate is made of an air-permeable material and said air-permeable mounting plate is further covered removably with an air-permeable material.

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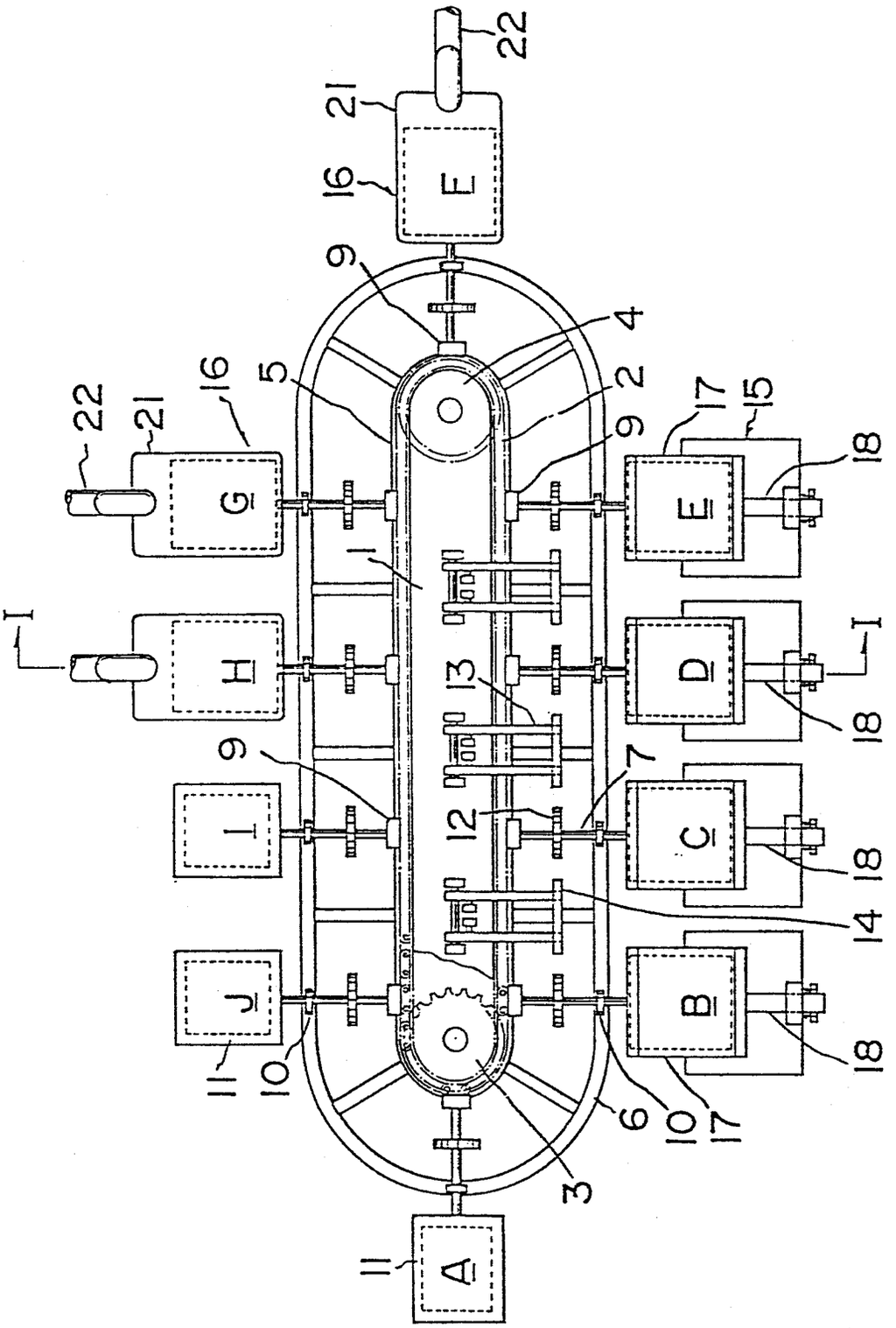
FIG. 1



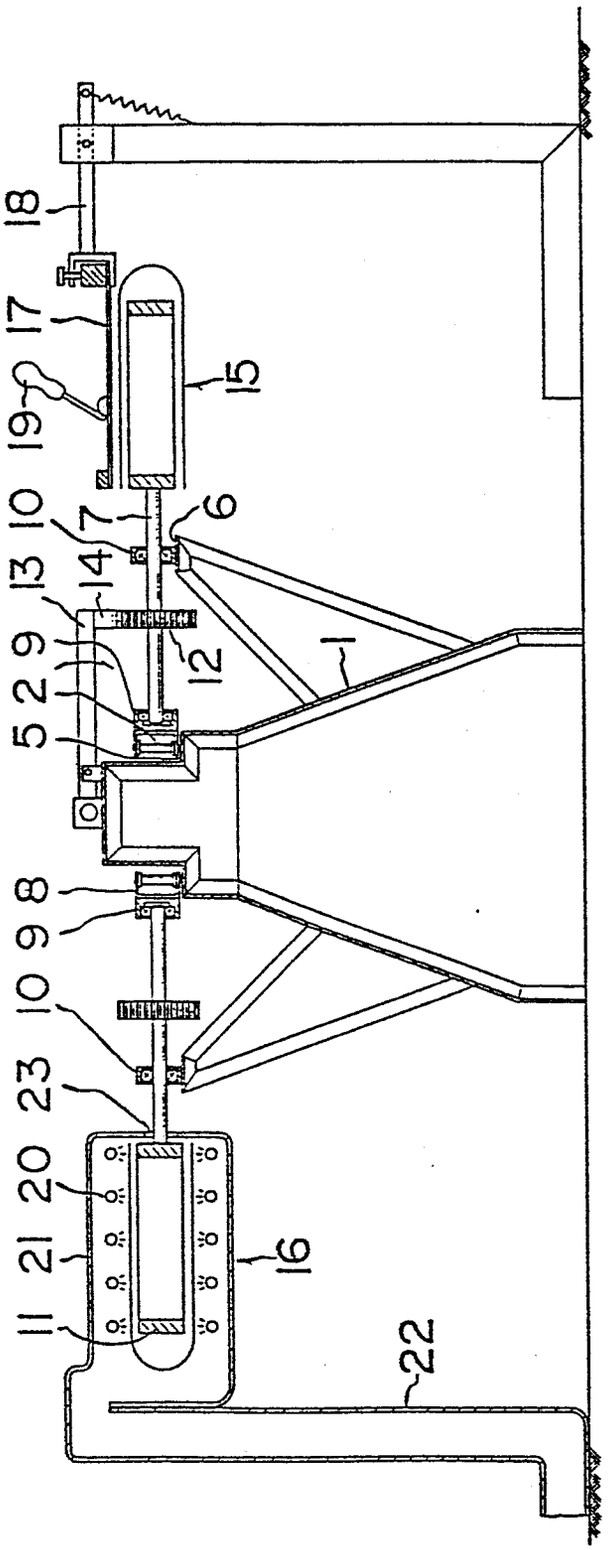


FIG. 2

FIG. 3

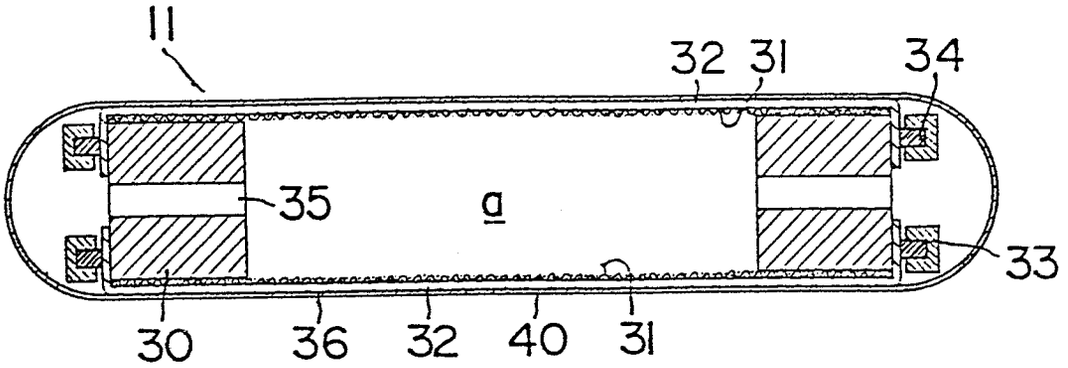


FIG. 4

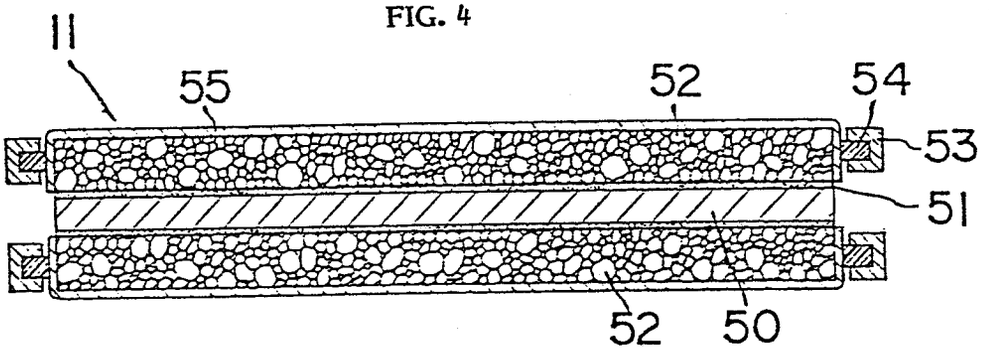


FIG. 5

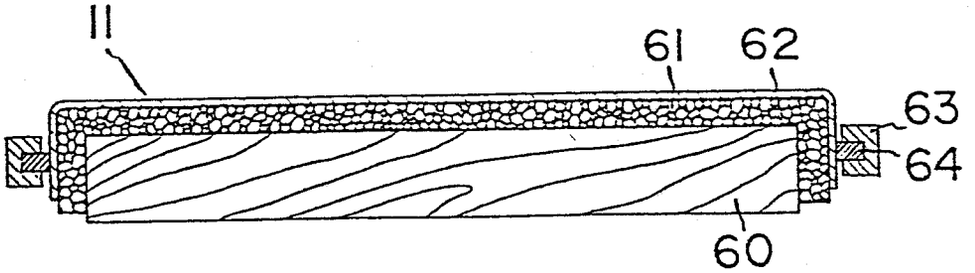
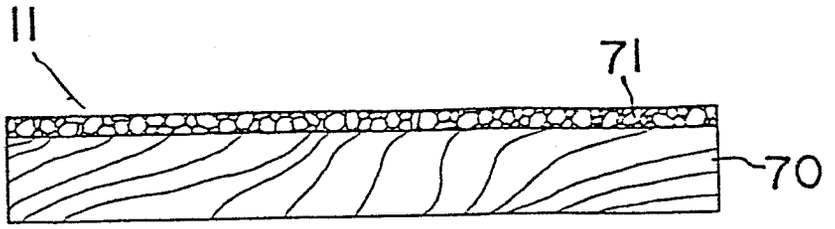


FIG. 6



INTERNATIONAL SEARCH REPORT

0125316

International Application No. PCT/JP83/00406

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.[3] B41F 15/18

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
I P C	B41F 15/08-15/32, 15/46, B41F 17/38

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched [5]

Jitsuyo Shinan Koho	1926 - 1983
Kokai Jitsuyo Shinan Koho	1971 - 1983

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category*	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
A	JP, B2, 56-115240 (Ryukyu Screen Printing Corp.) 4. September. 1981 (04. 09. 81)	1
A	JP,A2, 55-111261 (Toshin Kogyo Kabushiki Kaisha) 27. August. 1980 (27. 08. 80)	1
A	JP,A2, 53-52788 (Matteus Mittel) 13. May. 1978 (13. 05. 78)	1
A	JP,A2, 53-42912 (Matteus Mittel) 18. April. 1978 (18. 04. 78) & US,A 4,173,928 & FR,A1, 2,365,439 & ES,A1, 462,613 & DE,A1, 2,643,226	1

* Special categories of cited documents: [15]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
February 6, 1984 (06. 02. 84)	February 27, 1984 (27. 02. 84)
International Searching Authority [1]	**Signature of Authorized Officer [20]**
Japanese Patent Office	