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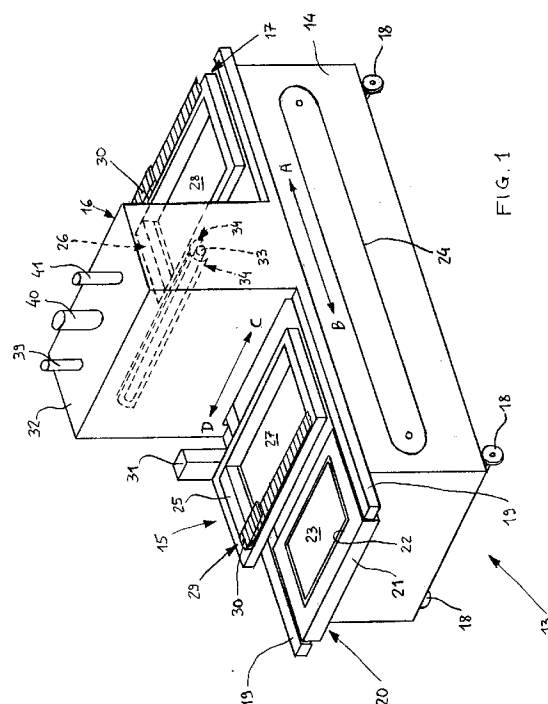
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(54) **Silk - screen printing machine.**

(57) Silk - screen printing machine of products which may be fitted particularly on machines and/or plants of different kind, comprising on a single supporting structure (14) two silk - screen printing units (15, 17) of per se known kind and a drying unit of per se known kind too.

A movable carriage (21) provides to displace each product (23) firstly toward the second silk - screen printing unit (17), by applying a first series of silk - screen printed inscriptions on the product on the first silk - screen printing unit (15) and by drying rapidly them on the drying unit (16), and then from the second silk - screen printing unit (17) toward a loading station (20) provided in the front of the machine, by applying additional inscriptions on the product.



The invention relates to a silk - screen printing machine, employed particularly for the silk - screen printing of separated component parts made of plastic material or of other materials, which may be obtained industrially on variable lots.

Silk - screen printing machines of various kinds and for the more different uses are known, i.e. for silk - screen printing of cardboards etc., generally comprising one or more printing units in which at least one frame made of polyester fibers containing the inscriptions and/or the symbols and/or the numbers to be applied on the products to be silk - screen printed, is removably fitted, as well as comprising a system for supporting and handling such products, adapted to transport in succession each product firstly in correspondence of each printing unit, where the silk - screen printing process on the same product is effected in a per se known manner, and thereafter toward a drying unit of conventional type, i. e. a hot air forced convection tunnel type furnace, a ultraviolet radiations furnace etc., to cause the inks utilized for the screen - printing process to be dried, and finally, in case, toward additional printing and drying units for applying further superimposed and/or additional inscriptions on the products.

In particular, silk - screen printing machines are known for applying inscriptions, numbers and/or symbols on parts made generally of plastic material, i. e. products intended for large scale consumptions, particular component parts to be assembled on machines and plants of different kind as washing machines, dish - washing machines, refrigerators, small household appliances etc., in order to confer aesthetic appearances and characteristics which mark such machines and plants. These silk - screen printing machines are generally constituted by at least a printing unit and a supporting and handling system for the products to be silk - screen printed, which are of the same kind of those of the previously mentioned printing machines, in which such a supporting and handling system is so designed as to move the products to be silk - screen printed from a starting loading position thereof, to an intermediate position thereof in which the products are disposed below the associated printing unit and stopped at such a position, in order to permit the silk - screen printing process by said printing unit to be effected, and finally to move the silk - screen printed products toward a final unloading position, coincident with the starting loading position, for drawing the silk - screen printed products from such a system and loading new products on the same system, in order to permit the silk - screen printing process thereof with the same described operative steps.

Finally, the drying of all the silk - screen printed products is carried out in a separated and conventional drying unit, in which the products are positioned manually and thoroughly dried therein, for permitting

the subsequent drawing and packing thereof. However, these silk - screen printing machines do not allow on the one hand to carry out on a fully automatic way all the steps of the silk - screen printing process, since they require the manual intervention of the operator for moving the silk - screen printed products toward the drying unit, and on the other hand do not lend themselves to the eventual silk - screen printing process of other inscriptions, numbers and/or symbols on the products, when required for aesthetical, commercial etc. reasons, since in this case it would be necessary to repeat the forking steps in printing units equipped for this object, so that the machines referred to would require to perform several processings in times of long duration, with consequent little rational and expensive productive performances.

The present invention has the object to eliminate the above mentioned drawbacks and limitations, by means of a silk - screen printing machine of simple and compact type, adapted to obtain high productive performances and to permit also the silk - screen printing process of different inscriptions, and different numbers and/or symbols on the products of the above specified kind.

This silk - screen printing machine is obtained with the substantially described constructive features, with particular reference to the attached claims of the present patent.

The invention will appear better understandable from the following description, given solely by way of a not-limiting example and with reference to the accompanying drawings, wherein :

- Fig. 1 shows a perspective view of the silk - screen printing machine according to the invention ;
- Fig. 2 schematically shows a side view of the drying unit of the present silk - screen printing machine, operated at a first operative position thereof ;
- Figs. 3 and 4 show the drying unit of fig. 2 operated at a second and a third operative position thereof, respectively ;
- Figs. 5-12 schematically show a perspective view of the main operative steps of the present silk - screen printing machine, required for performing two different silk - screen printing operations on each product.

Now, referring to the Fig. 1, it is represented schematically a silk - screen printing machine 13 according to the invention, provided particularly for applying inscriptions, numbers and/or symbols on products made of plastic material or other materials, for consumptions intended for large scale, for specific component parts to be assembled on machines and plants of different kind, as i.e. clothes washing machines, dish - washing machines, refrigerators, ranges and other kinds of household appliances etc., in order to confer aesthetical aspects and characteris-

tics which mark them. This silk - screen printing machine substantially comprises a single supporting structure 14 having almost parallelepiped form, extended in the longitudinal direction, in which there are provided in succession and combined to each other a first silk - screen printing unit 15, a drying unit 16 and a second silk - screen printing unit 17, which are realized in the manner and for the purposes which will be described. Such supporting structure 14, which has compact dimensions and may be supported on the floor by adequate lower wheels 18, permitting it to be shifted simply and easily on the same floor, is furthermore provided with two longitudinal guide members 19, parallel from each other and extended for the entire length of the machine, at a position below and through all the two silk - screen printing units 15 and 17 and the drying unit 16, said longitudinal guide members being extended also from the front part of the machine, thus constituting a loading station 20.

A movable carriage 21 of parallelepiped form is also supported onto the said longitudinal guide members 19 and is provided with a hollow 22, dimensioned for housing each product to be superficially silk - screen printed, in a way that such product be arranged preferably at the level of the upper surface of the same carriage (in the present case, the product being made of molded plastic material, of parallelepiped form, is marked with the reference numeral 23). Such carriage 21 is driven by adequate powered driving mechanisms, of per se known kind, marked with the reference numeral 24, longitudinally along the guide members 14 of the machine supporting structure 14, either on the one or the other one of the two sliding directions A and B, opposite from each other, so as to pass in succession through the first silk - screen printing unit 15, the drying unit 16 and the second silk - screen printing unit 17, when it is driven in the direction A on the forward stroke thereof, and to pass from such second silk - screen printing unit 17 again through the drying unit 16 and the first silk - screen printing unit 15, by returning then at the position corresponding to the loading station 20, when it is driven in the direction B on the backward stroke thereof.

Each one of the silk - screen printing units 15 and 17 is disposed orthogonally with respect to the sliding directions A and B of both the movable carriage 21 and the associated product 23 to be silk - screen printed housed therein and is substantially constituted. in a per se known manner, by at least a respective doctor 25 and 26 for applying the ink onto a respective horizontal flat surface 27 and 28, supported by the associated silk - screen printing unit on the lower part thereof, and on which at least a silk - screen printing frame made of polyester (not shown) is removably fitted by per se known fixing systems, in which frame there are provided the inscriptions, the numbers

and/or the symbols to be applied by the silk - screen printing process on the upper surface of each product. The silk - screen printing units 15 and 17 are provided for silk - screen printing on each product of respective first and second series of inscriptions, numbers and/or symbols, at different and/or superimposed positions, with two distinct operative steps performed on the same machine, namely a first operative step during the forward stroke in the direction A of the carriage 21, together with the associated product 23 housed therein, in which such first series of inscriptions, numbers and/or symbols are silk - screen printed on the product, and a second operative step during the backward stroke in the direction B of the carriage 21, in which such second series of inscriptions, numbers and/or symbols are silk - screen printed on the product. usual, each doctor 25 and 26 of the relevant silk - screen printing units 15 and 17 is slidable alternately either in the one or the other one of the two directions C and D, opposite from each other and orthogonally to the sliding directions A and B of such movable carriage 21, above the respective flat surface 27 and 28 which is dimensioned for the accommodation of its own doctor.

Moreover, each of said doctors may be driven either on the one or the other one of its sliding directions C and D by means of powered driving mechanisms of per se known manner, marked with the reference numeral 29, which may be constituted either by tracks 3() and a motor 31, as in the present case, or by systems with pneumatic or hydraulic pistons, or by other suitable conventional driving members, and commonly used on the other silk - screen printing machines, provided for different applications.

Furthermore, these driving mechanisms permit also to drive each doctor 25 and 26 in a vertical direction, orthogonally to the sliding directions C and D, from a first to a second operative position in which such doctor is respectively raised or lowered with respect to the correspondent flat surface 27 and 28 of the associated silk - screen printing unit 15 and 17. Each so predisposed silk - screen printing unit permits to carry out the silk - screen printing process with customary criteria on each product which is shifted by the carriage 21 at a position below it and slightly shifted vertically with respect to the lower surface of the same silk - screen printing unit. In fact, also in this case the silk - screen printing process is performed, by keeping the carriage 21 and the product 23 housed therein stopped at the position below the associated silk - screen printing unit, by operating each doctor 25 and 26 on its second operative position, lowered, in which such doctor is disposed in contact with the relative flat surface 27 and 28 and the silk - screen printing frame fitted thereon, and additionally by operating such doctor on its sliding direction C, thus causing also the contact of such silk - screen printing frame with the outer surface of the product 23

and therefore the penetration on this latter of the ink poured onto said flat surface and distributed on said silk: - screen printing frame by the relevant doctor thereof.

Then, at the end of the forward stroke in the direction C, each doctor is moved on its first operative position, raised, and brought back on the starting position thereof with a backward stroke in the direction D opposite to the preceding one, in which said doctor is kept at a raised position, by predisposing it therefore to carry out a subsequent silk - screen printing operation in the same described manners.

In the case in which the shifting between the lower surface of each silk - screen printing unit 15 and 17 and the upper surface of the product 23 positioned below said silk - screen printing unit exceeds a determinate value, generally in the order of some millimetres, it is possible also to foresee a limited vertical stroke of the assembly flat surface - doctor with respect to the carriage 21, so that to displace such an assembly on a position closest and nearly in contact on the lower side with the product housed in the carriage, so that to permit to perform an effective silk - screen printing operation, and this vertical stroke may be effected by providing said assembly with conventional driving means suitable for this purpose.

Now, by examining the Fig. 2, it is schematically shown the drying unit 16 provided on the present silk - screen printing machine, and so realized as to allow an extremely rapid drying, in the order of some seconds, of the first and second series of inscriptions, numbers and/or symbols which have been silk - screen printed on the upper surface of each product 23, respectively on the silk - screen printing units 15 and 17. As it is apparent from this Figure, in particular, such drying unit is substantially constituted by a box - Like envelope 32 of almost parallelepiped form, made of insulating material of conventional type, extended orthogonally to the machine supporting structure 14 for the entire width thereof and for a limited length of the same and at a central position with respect to the two silk - screen printing units 15 and 17. Besides, such drying unit is provided with at least an ultraviolet radiation emitting elongated lamp 33, of per se known kind, housed and supported inside the box - like envelope 32 and extended almost for the entire length of said box - like envelope, as well as reflecting parabolic surfaces 34 arranged at a close position above the lamp 33, for the entire extent thereof, and supported laterally on the box - like envelope 32, for the purpose of reflecting downward the ultraviolet radiations generated by said lamp, against each silk - screen printed product 23 being conveyed by the carriage 21, when such carriage is operated at reduced speed at a position below the same lamp. Moreover, on the lower side of the box - like envelope 32 there are disposed two metallic flat surfaces 35 and 36, aligned to each other and slidable horizontally the

one toward the other one by means of per se known control members, incorporated on the drying unit 16, said flat surfaces being situated below the lamp 33 and above the silk - screen printed product 23, when this latter is moved by the carriage 21 on this position, and being adapted to permit or not permit the radiance downward depending on the operative position in which they are moved.

In particular, such flat surfaces 35 and 36 are shiftable horizontally from a first operative closing position, in which they are approached to each other, thus preventing the ultraviolet radiation emitted by the lamp and partially reflected by the parabolic surfaces 34 from passing therethrough, to a second opened position in which they are fully moved away from each other, thus permitting the ultraviolet radiation to pass therethrough.

The displacement of the two flat surfaces 35 and 36 is caused by the control of either at least two electric or electronic sensors 37 and 38, or other suitable monitoring elements of per se known type, operatively connected in the electric circuit of the drying unit 16, together with said control members of the same unit, said sensors being arranged in correspondence of the side ends of the box - like envelope 32 and being activated, independently the one from the other one, by the presence of both the carriage 21 and the silk - screen printed product housed therein, with the operative steps which will be described.

Finally, the box - like envelope 32 is further on provided with a suitable ventilation system to insure an effective cooling and an air exchange inside it, in order to prevent dangerous overheatings during the continuous connection, at full or reduced power, of the ultraviolet radiating lamp 33.

On the embodiment represented in Figure 1, this ventilation system is constituted by three vertical conduits 39, 40 and 41 joined to the box - like envelope 32 and communicating to the inside thereof, of which the central conduit 40 is joined to a suitable exhaust fan (not shown), adapted to suck the hot air from the inside of the same conduit, and the two side conduits 39 and 41 are joined to a blower (not shown), adapted to admit fresh air within said box - like envelope, thus providing an effective elimination of the heat produced by such lamp 33 and a continuous air exchange.

In the Figures 3 and 4 are now represented schematically two different operative positions assumed by the flat surfaces 35 and 36, depending on two shifting positions of the carriage 21, together with the relative silk - screen printed product 23, with respect to the box - like envelope 32 of the present drying unit. In particular, in the Figure 3 it is noted that the carriage 21 (together with the relative silk - screen printed product 23) is operated in the direction A, during its forward stroke, and its front end enters the monitoring field of the sensor 37, which therefore

senses the presence thereof by providing to determine by means of the main control device of the machine the displacement of the two flat surfaces 35 and 36 from the starting closed position thereof, shown in the Fig. 2, to the opened position thereof evident from the same Fig. 3. Such sensor 37, moreover, provides to change the feeding speed of the carriage 21 together with the relative product 23, by acting on the powered driving mechanisms 24 so as to reduce adequately such feeding speed, thus permitting the focusing of the ultraviolet radiation of the lamp 33 uniformly on all the silk - screen printed inscriptions on each product, with consequent drying thereof. Besides, the ultraviolet radiations emitted by the lamp 33 aren't irradiated also toward the outer ambient, thanks to the presence of the insulating shielding material from which the box - like envelope 32 is constituted. During the carrying out of this drying operation, the main control device of the machine provides to keep active the sensor 37 for the entire duration of the same drying operation, for a pre - established period of time and such that to insure an effective drying of the silk - screen printed inscriptions on each product, while on the contrary it provides to render inactive the remaining sensor 38. At the end of this operation, the sensor 37 does not more sense the presence of the carriage 21 and therefore deactivates itself automatically, thus causing a further feeding of the carriage together with the dried silk - screen printed product in the direction A, as well as the displacement of the flat surfaces 35 and 36 on their closing position, as evident from the Fig. 4.

Moreover, in this Figure it is noted that as soon as the carriage 21 enters the monitoring field of the remaining sensor 38, as at the position represented in the same Figure, this sensor does not cause any effect neither on the carriage movement nor on the flat surfaces 35 and 36, since it remains always inactive, and consequently such carriage may shift itself, together with the dried silk - screen printed product, on the subsequent operative position of the machine in correspondence of the silk - screen printing unit 17.

During the backward stroke of the carriage 21, in the direction B, the just described operative steps are repeated in the reverse succession, namely the presence of the carriage 21 provides to render active the sensor 38, as soon as it enters the monitoring field of said sensor, by keeping also inactive the sensor 37. Consequently, the carriage 21 together with the relative product is advanced again at reduced speed underneath both the box - like envelope 32 and the lamp 33, while the flat surfaces 35 and 36 are shifted again on the opened position thereof, thus causing a further drying of the silk - screen printed inscriptions effected on the product in the silk - screen printing unit 17.

Then, at the end of this operation, the sensor 38 is deactivated by the lack of the carriage 21, so that

the carriage 21 together with the doubly silk - screen printed and dried product is advanced in the direction B again, and, due to the fact that the sensor 37 remains always inactive, it may arrive directly on the next terminal operative position to permit the thus processed product to be unloaded from the same carriage. Now, by examining the Figs. 5 - 12, there are schematically shown the main operative steps of the present silk - screen printing machine.

In the Fig. 5, in particular, it is noted that the carriage 21 is shifted on the loading station 20, so that a product to be silk - screen printed 23 may be housed in the hollow 22 of the same carriage. Under these circumstances, the correspondent doctors 25 and 26 of the two silk - screen printing units 15 and 17 are displaced on their first operative position, raised, situated at the left hand of the associated flat surface 27 and 28, and are therefore predisposed for carrying out the respective silk - screen printing operations, while in turn the lamp 33 of the drying unit 16 is steadily on, either at fully or reduced power, and the lower flat surfaces 35 and 36 of such drying unit are displaced on their closing position.

In the Fig. 6 it is noted that the carriage 21 is being moving, together with the relative product 23, in the direction A toward the first silk - screen printing unit 15 for being stopped at this position, in which the product 23 is disposed exactly beneath the flat surface 27 of this silk - screen printing unit.

In the Fig. 7 it is noted that, by keeping both the carriage 21 and the product 23 stopped beneath the first silk - screen printing unit 15, the doctor 25 of the silk - screen printing unit 15 is operated on its second operative position, lowered, and in its sliding direction C, with consequent silk - screen printing processing of the first series of inscriptions, numbers and /or symbols on the outer surface of the product 23.

In the Fig. 8 it is noted that, after the silk - screen printing processing, the carriage 21 together with the silk - screen printed product 23 is always displaced in the direction A, in correspondence of the drying unit 16, while in turn the doctor 25 of the silk - screen printing unit 15 is operated on its first operative position again, raised, in its sliding direction D. In this way, the carriage 21 provides for controlling the operative steps described with reference to the Fig. 3, so that it is advanced slowly, together with the silk - screen printed product 23, below the lamp 33 of the drying unit 16, thus permitting to carry out a rapid drying of the first series of silk - screen printed inscriptions on such product, as described previously, and finally by causing, at the end of the drying operation, the displacement of the carriage 21 together with the dried silk - screen printed product toward the second silk - screen printing unit 17, always in its sliding direction A.

in the Fig. 9 it is noted that the carriage 21 is being moving toward the second silk - screen printing

unit 17, in its direction A, and therefore it provides to control the operative steps described with reference to the Fig. 4, with consequent displacement of the flat surfaces 35 and 36 of the drying unit 16 on their closing position, and positioning of the carriage 21, together with the relative silk - screen printed product, below the second silk - screen printing unit 17, where said carriage is stopped.

In the Fig. 10 it is noted that, still keeping stopped both the carriage 21 and the product 23 at the preceding position, the doctor 26 of the silk - screen printing unit 17 is operated on its second operative position, lowered, and in its sliding direction C, with consequent silk - screen printing process of the second series of inscriptions, numbers and/or symbols on the outer surface of the product 23. In the Fig. 11 it is noted that, after the silk - screen printing process, the carriage 21 together with the silk - screen printed product 23 is moved in the opposite direction B, in correspondence of the drying unit 16 again, while in turn the doctor 26 of the silk - screen printing unit 17 is operated again on its first operative position, raised, in its sliding direction D. In this way, during this backward stroke the carriage 21 provides to control in a reverse manner the operative steps described with reference to the Fig. 4, so that it is advanced slowly, together with the silk - screen printed product 23, below the lamp 33 of the drying unit 16, thus permitting to carry out the rapid drying operation of the second series of silk - screen printed inscriptions on such product, as previously described.

Thereafter, at the end of the drying operation, with operative steps in a reverse manner with respect to those described with reference to the Fig. 3, the carriage 21 is moved in the direction B again, together with the relative silk - screen printed and dried product, toward the loading station 20 by passing through the first silk - screen printing unit 16, where however such carriage isn't more stopped. Finally, in the Fig. 12 it is noted that the carriage 21 is arrived on the loading station 20, where it is stopped, thus permitting the extraction of the silk - screen printed product 23 therefrom, which therefore may be packed and forwarded to the destination place, and permitting also to introduce a new product to be silk - screen printed within such carriage, for carrying out of the same just described operative steps. Thus, the advantages attainable by employing the silk - screen printing machine according to the invention appear evident. This machine, in fact, allows to carry out fully automatically all the silk - screen printing steps of at least two different series of inscriptions, numbers and/or symbols, as well as of relevant drying operations thereof, on each product to be silk - screen printed, by eliminating any manual intervention by the operator, obviously except the loading and unloading operations of the products with respect to the machine and the needed operations for making it func-

tional, and such steps are performed in rapid times thus allowing to obtain high productive performances, with the possibility to adapt quickly and flexibly the machine to the silk - screen printing process also of products of different type, forms and dimensions, with rapid adaptation times and few and simple operations.

Obviously, the machine lend itself to possible variants too, as i. e. the replacement of the flat surfaces 35 and 36 of the drying unit 16 by bent or differently shaped surfaces, provided for the same purposes, or the possible coupling of such machine with other silk - screen printing machines of conventional type, thus without departing from the protection sphere of the present invention.

Claims

1. Silk - screen printing machine of products of various kind, as i.e. products intended to be assembled on machines, plants etc..., manufacturable in variable lots, comprising per se known silk - screen printing means for applying of inscriptions, numbers and/or symbols on each product, per se known drying means constituted preferably by at least a ultraviolet radiation emitting lamp, shielded by a suitable insulating material or the like, adapted to dry on short times the inscriptions which have been silk - screen printed on the products, and means for conveying and supporting the products, which are interlocked with control means, characterized in that it comprises additional silk - screen printing means (17), adapted to apply further inscriptions, numbers and/or symbols on each product (23) and provided on a single support structure (14) of the machine, combined with said silk - screen printing means (15), said drying means (16) and said conveying and supporting means (21), in such a way that said drying means (16) be disposed at an intermediate position between said silk - screen printing means (15) and said additional silk - screen printing means (17), said conveying and supporting means (21) being adapted to displace selectively the products (23), loaded on a loading station (20) associated therewith, toward said additional silk - screen printing means (17), through said silk - screen printing means (15), with feeding movements at reduced speed through said drying means (16), and from said additional silk - screen printing means (17) toward said loading station (20) for unloading the products (23) therefrom, with feeding movements at reduced speed through said drying means (16).
2. Silk - screen printing machine according to claim 1, in which said drying means comprise first and

second movable lower surfaces, associated with said lamp and operable from a first to a second operative position, for closing and opening respectively, for preventing or permitting the passage of the radiation emitted by said lamp, characterized by first and second sensor means (37, 38) associated with said drying means (16) and interlocked with said control means, adapted to determine the feeding movement at reduced speed of said conveying and supporting means (21), together with the relative product (23), below said lamp (33), when they are respectively displaced from said loading station (20) toward said additional silk - screen printing means (17) and in a reverse direction, by operating simultaneously said first and second movable surfaces (35, 36) from the first to the second operative position thereof, said first and second sensor means (37, 38) being also adapted to permit the feeding movement of said conveying and supporting means (21) and the product (23), at the end of the drying operation, as well as to operate said movable surfaces (35, 36) from the second to the first operative position thereof.

3. Silk - screen printing machine according to claim 2, characterized in that said conveying and supporting means comprise a movable carriage (21) interlocked with said control means and slidable rectilinearly and reciprocatingly onto longitudinal guide members (19) of said supporting structure (14), from said loading station (20) to said additional silk - screen printing means (17), and vice versa, at a position below both said silk - screen printing means (15, 17) and said drying means (16).

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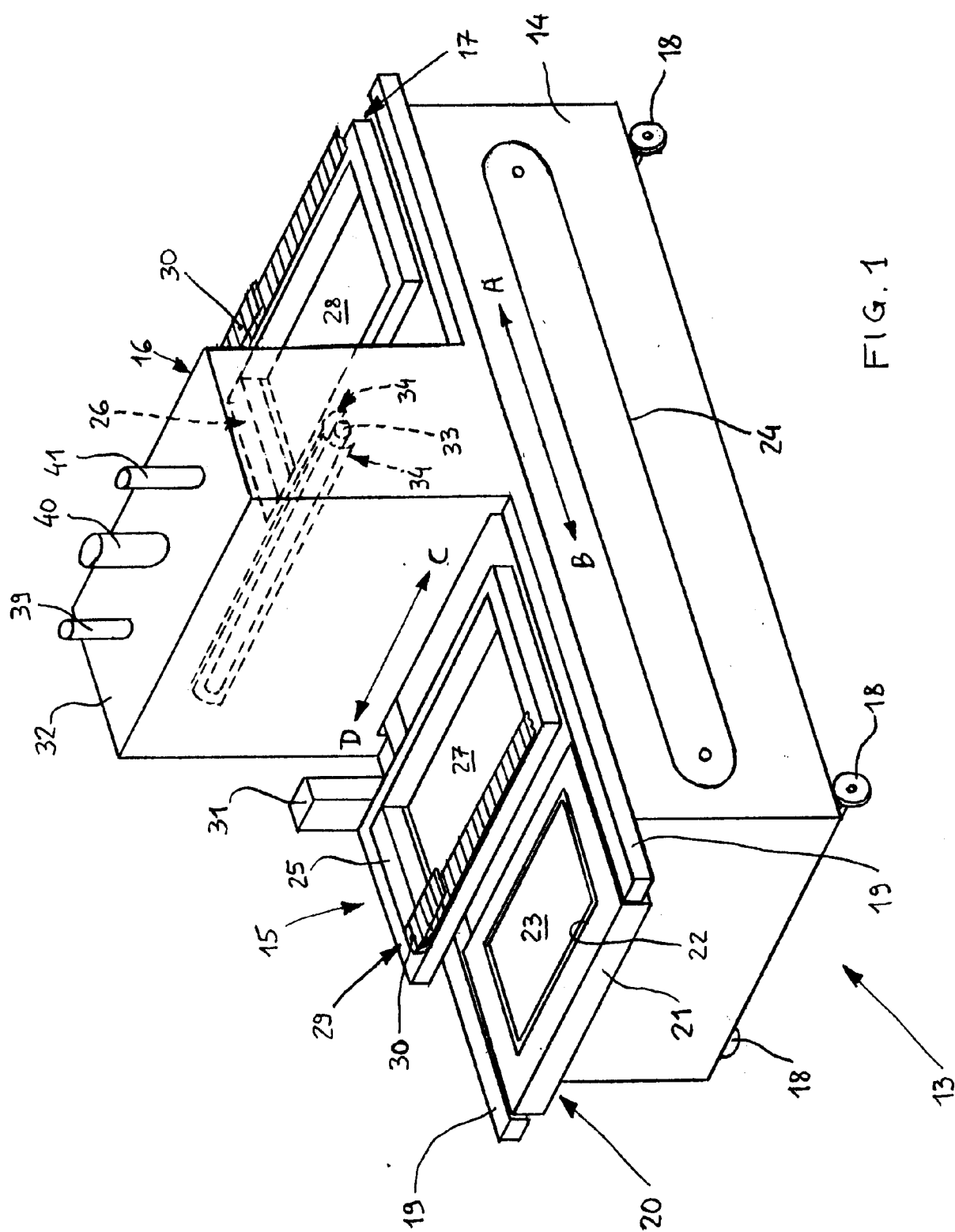
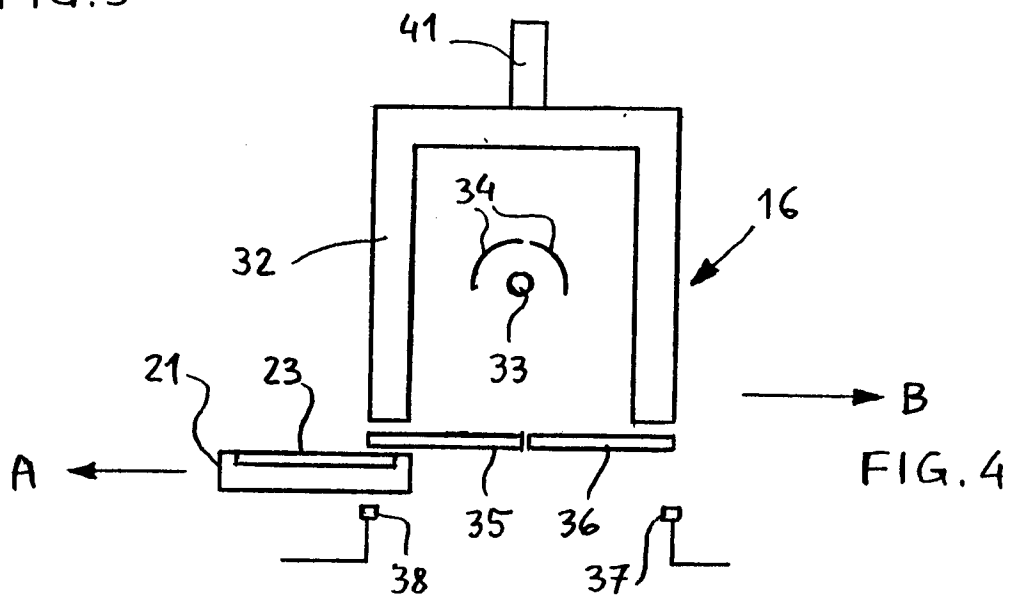
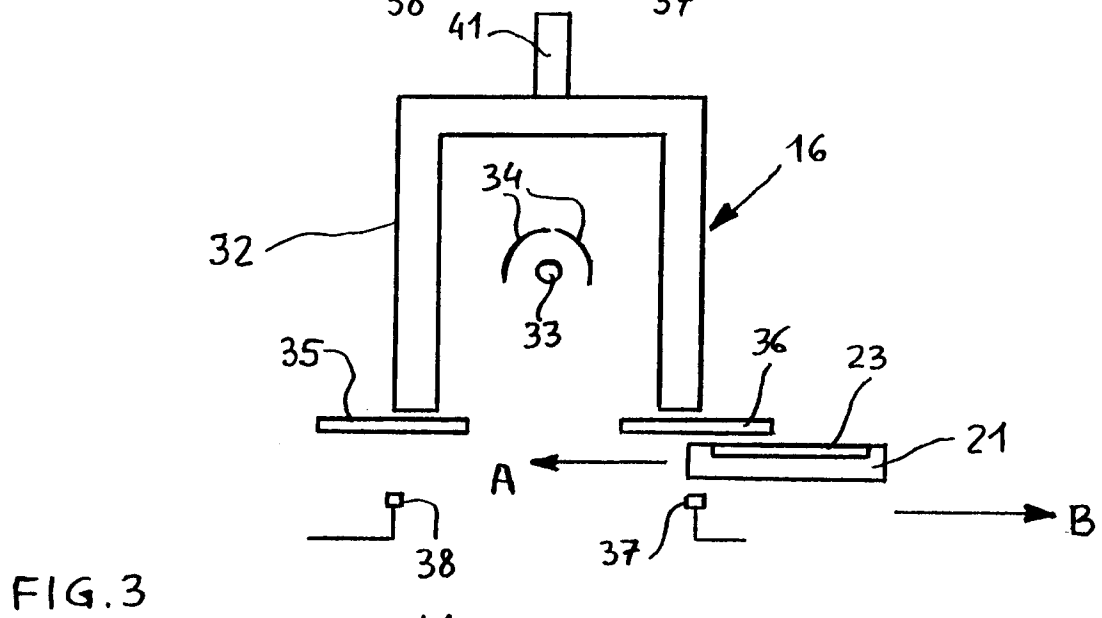
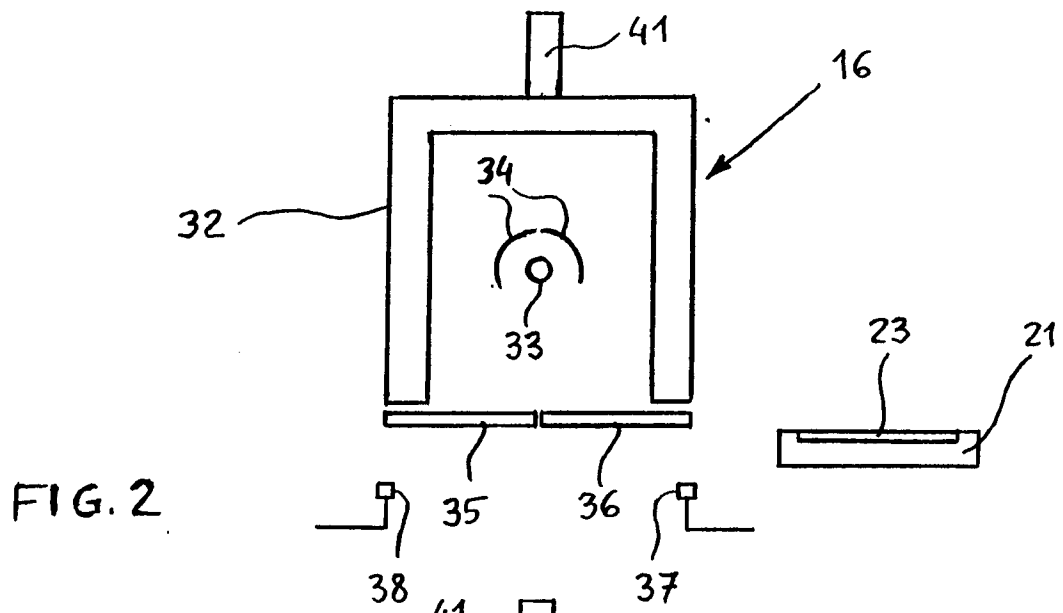


FIG. 1



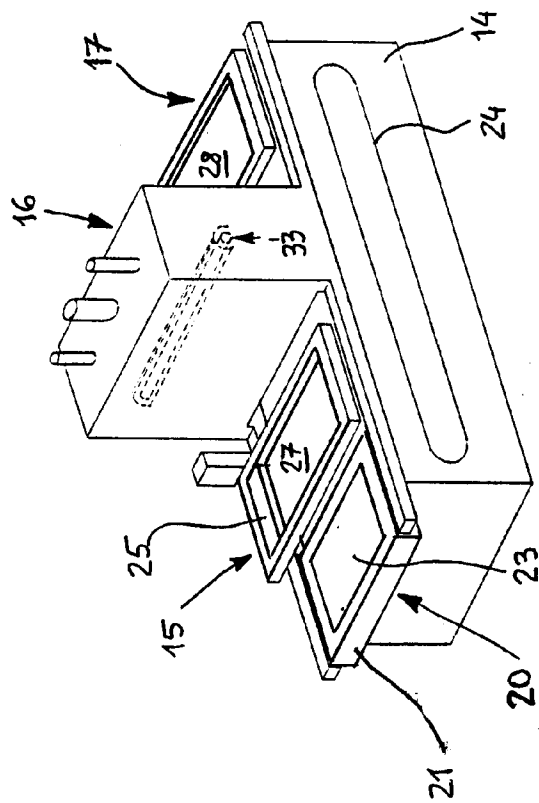


FIG. 5

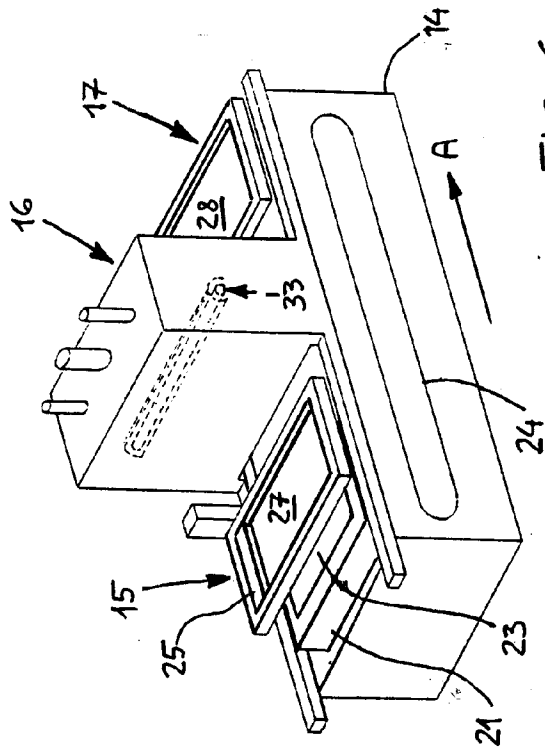


FIG. 6

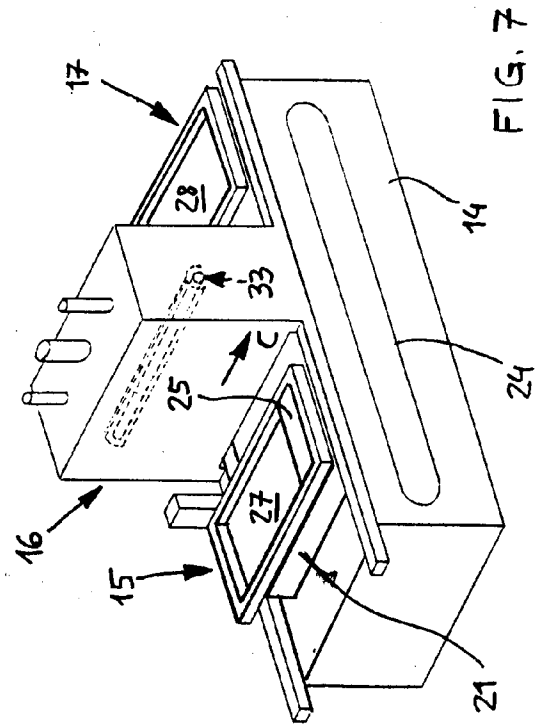


FIG. 7

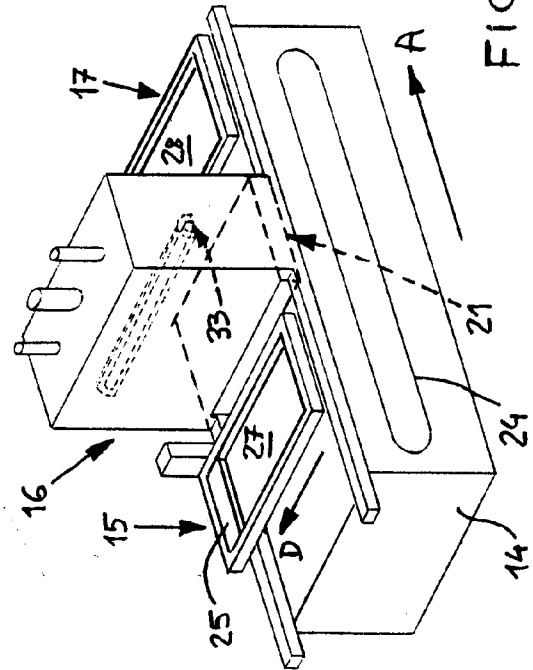
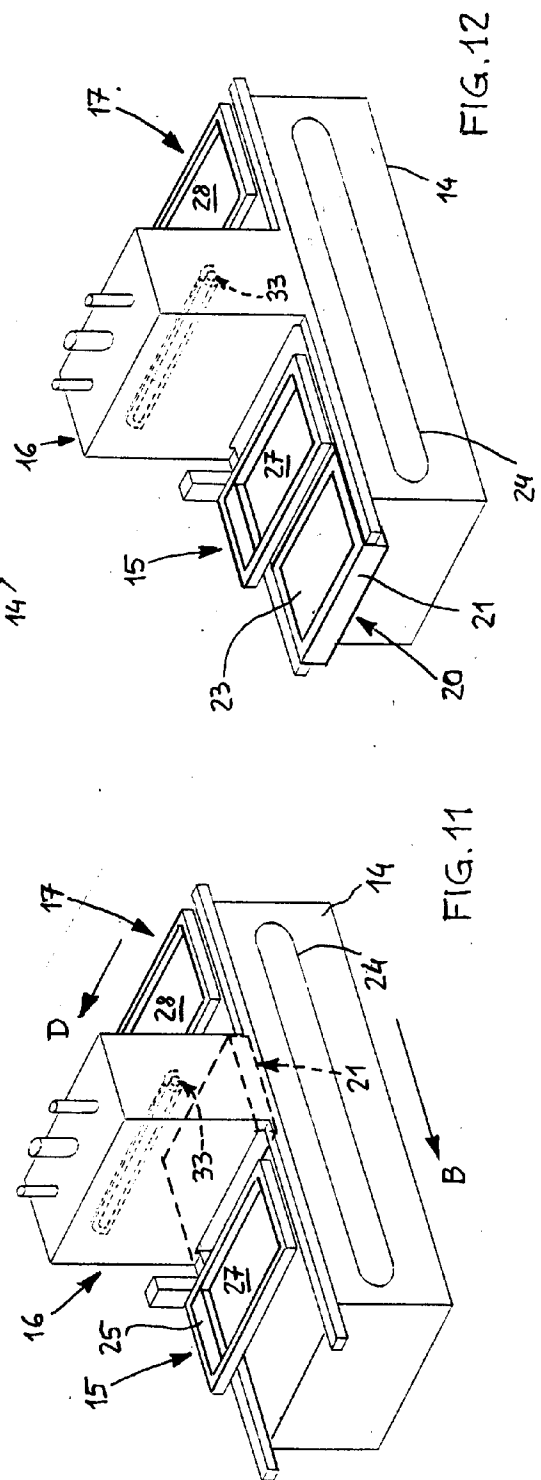
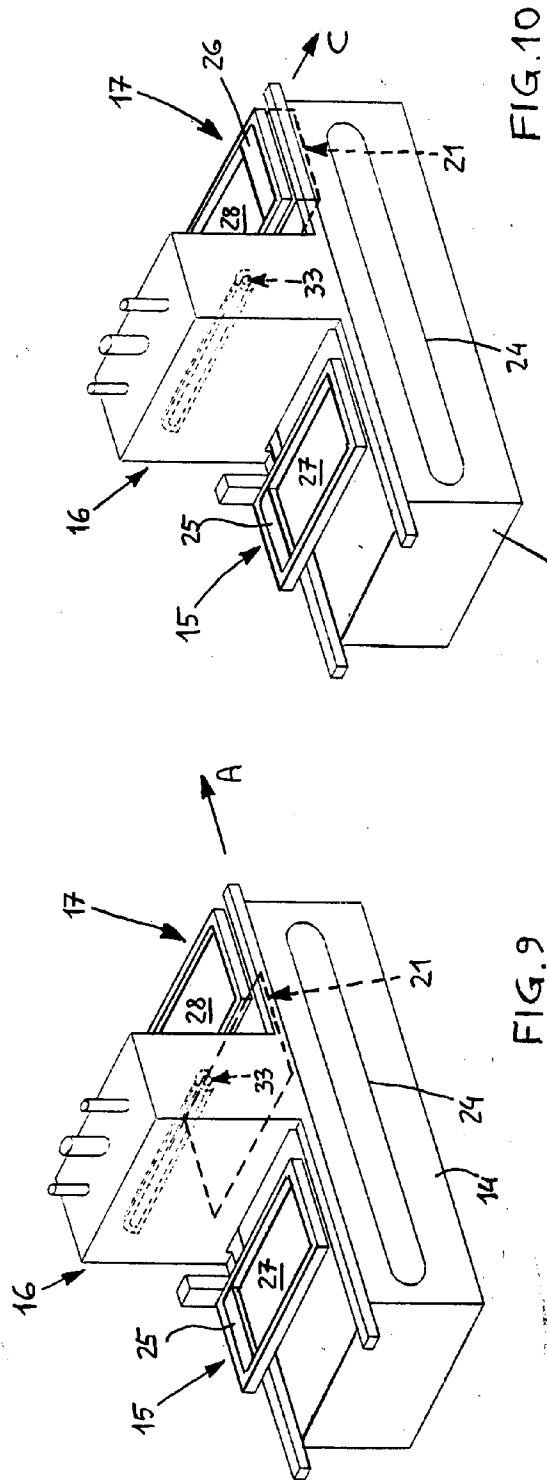


FIG. 8





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 93 10 8644

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	EP-A-0 105 857 (SVECIA SILKSCREEN MASKINER AB) * the whole document *	1,3	B41F15/12
A	---	2	
A	DE-A-3 148 681 (VEB KONTAKTBAUELEMENTE UND SPEZIALMASCHINENBAU) * the whole document *	1-3	
A	GB-A-832 650 (FERNANDEZ) * the whole document *	1-3	
A	Brochure from SERIMEK "Screenprinting equipment" Pages 5 - 7 Displayed at FESPA 5 May 1988 -----	1-3	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B41F
Place of search THE HAGUE		Date of completion of the search 07 SEPTEMBER 1993	Examiner MADSEN P. A.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P0401)