United States Patent

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[33] **Switzerland**
[31] **908/68 and 13407/67**

[54] **ROLLING CONTACT SCREEN PRINTING MACHINE WITH DEFORMABLE COUNTERPRESSURE MEMBER**
5 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **101/114,** 101/120, 101/407R
[51] **Int. Cl.** **B41f 15/08,** B41f 15/18
[50] **Field of Search** ..... 101/116, 119—122, 124, 126, 127.1, 407, 114; 118/D, S

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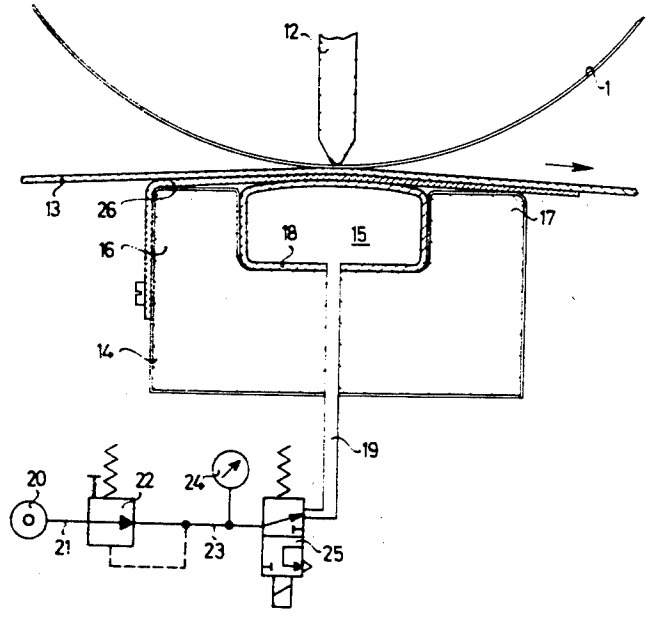
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ABSTRACT: There is disclosed a rotary screen printing machine, the individual printing stations of which are equipped with a circular screen, beneath which passes the back cloth or printer's blanket with the material which is to be printed. According to the invention, a stationary counterpressure body member is arranged vertically beneath the circular screen and below the printer's blanket.



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SHEET 1 OF 2

FIG. 1

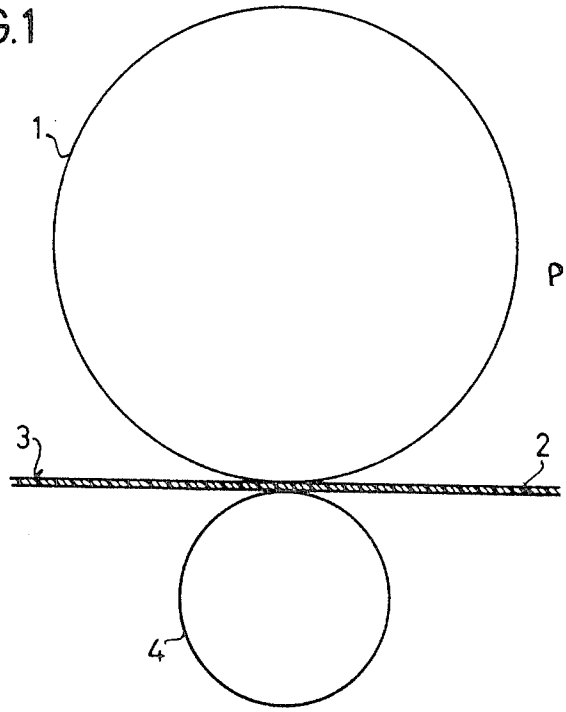
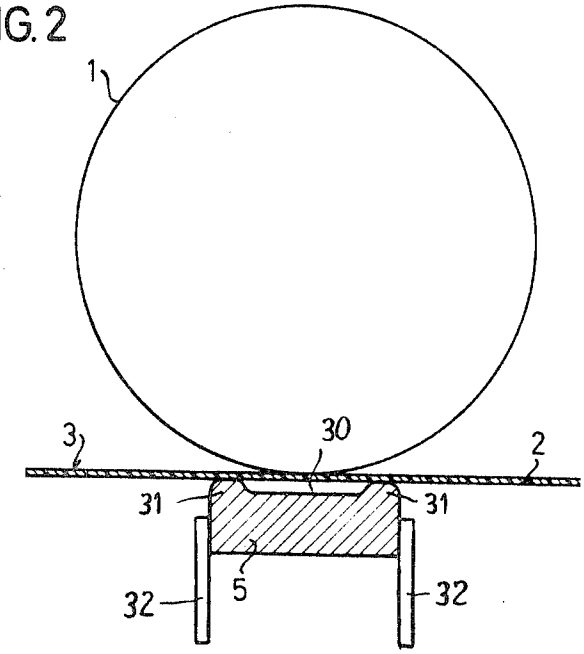


FIG. 2



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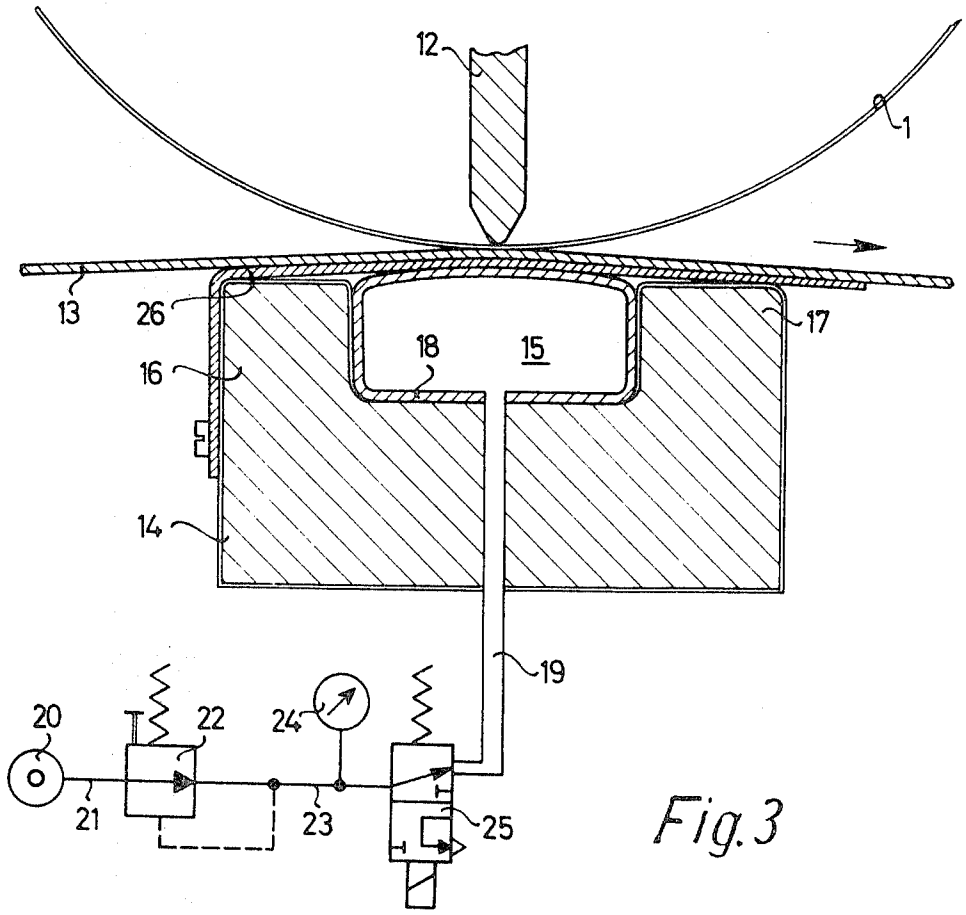


Fig. 3

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ROLLING CONTACT SCREEN PRINTING MACHINE WITH DEFORMABLE COUNTERPRESSURE MEMBER

BACKGROUND OF THE INVENTION

The present invention relates to an improved rotary screen printing machine.

One such type printing machine embodies a number of printing stations which are equipped with a circular screen and a squeegee system for distributing the printing ink or dye at the inside of the circular screen. This circular screen rotates in synchronism with the backing cloth or printer's blanket upon which is fixed in a suitable manner the material which is to be printed. In order to support the backing cloth or printer's blanket there is generally provided a counterpressure roller which is arranged vertically beneath the circular screen below the printer's blanket. This counterpressure roller must be capable of being lowered in order, if desired, to bring about an immediate interruption of the printing operation. These counterpressure rollers are very susceptible to becoming soiled or contaminated because dirt can very easily settle and form at a rotating roller which is contacted by a band moving along therewith. As a result, the diameter of the roller changes, and specifically, generally in a nonuniform fashion, and more precisely only locally. Consequently, there occurs an irregular squeegee pressure and, therefore, an irregular printing operation.

In order to alleviate these problems it was necessary to resort to periodic cleaning of the counterpressure roller. In the case of very wide machines, the squeegee system can bend through, so that an irregular squeegee pressure can likewise result.

SUMMARY OF THE INVENTION

Accordingly, it is a primary objective of the present invention to provide an improved rotary screen printing machine which effectively overcomes the aforementioned drawbacks of the prior art structures.

Another, more specific object of the present invention concerns itself with the provision of an improved rotary screen printing machine which prevents the irregular squeegee pressure and the thus resulting drawbacks.

Now, in order to implement these and still further objects, which will become more readily apparent as the description proceeds, and for the purpose of overcoming the previously recited disadvantageous operation or affects of the prior art rotary screen printing machines, the invention contemplates the provision of a stationary counterpressure body member which is disposed vertically beneath the circular screen below the backing cloth or printer's blanket.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood, and objects other than those set forth above will become apparent, when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

FIG. 1 is a schematic sectional representation of an embodiment of prior art rotary screen printing machine;

FIG. 2 is a schematic sectional representation of a first embodiment of rotary screen printing machine incorporating a counterpressure body member as contemplated by the invention; and

FIG. 3 is a schematic sectional view of a second embodiment of rotary screen printing machine incorporating a counterpressure body member as contemplated by the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now generally to the drawings, it is to be understood that reference numeral 1 designates the circular printing screen which is constructed to provide a hollow cylindrical body; the width of which corresponds to the width of the material which is to be printed. This circular screen is rotatably mounted at both of its opposite ends in any suitable fashion, well known to the art, in the nonillustrated machine frame, and furthermore, is subjected to a longitudinal tension or traction. As is again well known to those versed in this particular art, the printing ink or dye is introduced by means of a suitable squeegee or doctor system into the inside of the circular screen and is applied to the inner surface of the hollow cylinder of the circular printing screen 1. Then, the printing ink escapes through the fine perforated cylinder material in accordance with the applied pattern and, therefore, the fabric or material 3 disposed upon the backing cloth or printer's blanket 2 is printed during continuous feed.

With the foregoing background information in mind, and referring now more specifically to the prior art arrangement depicted in FIG. 1, it will be recognized that with the previously known embodiments a counterpressure roller member 4 is arranged beneath the circular screen 1 below the printer's blanket 2. This counterpressure roller member 4 is likewise rotatably mounted at the machine frame in any suitable nonillustrated manner. Additionally, the counterpressure roller member 4 is arranged so that it can be lowered, as desired.

Now, in FIG. 2 there is schematically depicted a first embodiment of inventive rotary screen printing machine which, as will be explained shortly, differs from the previously discussed prior art construction. As far as some of the common features between the arrangements of FIGS. 1 and 2, it will be understood that in the inventive arrangement of FIG. 2 the circular printing screen 1 and the backing cloth or printer's blanket 2 are disposed in exactly the same manner as the arrangement of these elements in FIG. 1. However, instead of employing the counterpressure roller member 4 of FIG. 1, in this case there is provided a stationary counterpressure body member 5. Furthermore, it will be recognized that the central region of this counterpressure body member 5 is provided with a recess or channel 30 which is open in a direction confronting the printing blanket 2, and additionally, possesses at both of its marginal regions a respective supporter sliding ridge 31. These ridges or projections 31 are advantageously well rounded and their surfaces are polished. Since the printing blanket or backing cloth 2 slides upon these ridges 31 it is not possible for any dirt or other contaminants to collect, and therefore, no change in the squeegee pressure can occur. It should be understood that the slide ridges 31 should not be spaced too far apart, rather at most at a distance corresponding approximately to the radius of the circular printing screen 1. Also, it might be mentioned that these ridges 31 can be arranged either symmetrically to the printing line of the circular screen 1 or also asymmetrically with respect thereto.

It has been surprisingly discovered that it is not necessary to arrange the counterpressure body member 5 directly beneath the contact line of the printing screen 1. The prestress or pretension of the backing cloth or printer's blanket 2 and the arrangement of the slide ridges 31 which are not spaced too far from one another provide a sufficiently rigid support for the circular printing screen, whereby there is additionally obtained a desired slight elastic flexibility.

The counterpressure body member 5 is also, in this case, mounted at both of its ends in the machine frame and is constructed such that it can be quickly lowered, for instance, by mounting such counterpressure body member in the schematically illustrated rails or guides 32 of FIG. 2.

In FIG. 3 there is illustrated a further embodiment of counterpressure body member by means of which, just as in the case of the embodiment of FIG. 1, there can be maintained a uniform or constant squeegee pressure.

Referring now to this FIG. in greater detail, it should be understood that reference numeral 1 again designates the printing screen possessing the form of a circular screen. Inside of the printing screen 1 there is arranged a suitable schematically illustrated squeegee 12 or equivalent element which serves to force the printing ink or dye through the fine openings of the printing screen. Located below and adjacent the printing

screen 1 is the backing cloth or printer's blanket 13 to which there is secure in any suitable manner the web of material or fabric which is to be printed during the printing operation. In order to preserve clarity in illustration the web of fabric has been conveniently omitted from this FIG.

Continuing, it will be observed that a counterpressure body member 14 is arranged beneath the backing cloth or printer's blanket 13. This counterpressure body member 14 is located approximately vertically beneath the printing screen 1. Moreover, in the depicted embodiment such counterpressure body member 14 possesses an approximately rectangular cross section and incorporates a recessed portion or channel 15 between both of the support ridges 16 and 17.

Also, in this physical manifestation of the invention, an elastic hollow body member 18 is inserted in the channel or recessed portion 15. Such elastic or resilient hollow body member 18 can be filled with a suitable pressurized medium through the agency of the conduit 19. This pressurized medium is received from the schematically illustrated pressurized medium source 20 and delivered via the conduit 21 to a pressure regulating valve 22, the latter serving to adjust and regulate the pressure prevailing in the elastic hollow body member 18. Upon leaving the pressure regulating valve 22 the pressurized medium passes through a conduit 23 with which there is operably associated a manometer 24 for control purposes and then, arrives at an electromagnetically actuated three-way valve unit 25 which is constructed to possess two switching positions. In the illustrated position of this three-way valve unit 25 the pressurized medium is delivered via the conduit 19 to the elastic hollow body member 18, whereas in the other switching position the conduit 23 is closed and the conduit 19 communicates with a suitable discharge so that the pressure in the elastic hollow body member 18 can be reduced to atmospheric pressure.

According to a further aspect of the invention, an intermediate layer or member 26 is inserted between the counterpressure body member 14 and the backing cloth or printer's blanket 13. This intermediate layer 26 serves as a protection member against wear and at the same time reduces the sliding resistance of the printer's blanket 13 with respect to the counterpressure body member 14 and the elastic body member 18, respectively. A foil formed of "TEFLON" has been found to be a suitable material for the intermediate layer 26.

It might further be remarked that the elastic body member 18 is advantageously constructed as a hollow profiled, hoselike member formed of rubber, for instance, and whose end faces are closed. Compressed air has been found to be a suitable pressurized medium and such can be supplied from an already existing supply source or network and, if desired, with additional cleaning thereof prior to delivery to the pressure regulating valve means 22. However, other types of pressurized media could be employed such as pressurized oil or, for instance, nitrogen, the latter of which would then be supplied from a nitrogen flask.

The apparatus depicted in FIG. 3 functions in the following manner: by means of the pressure regulating valve 22 the desired pressure which is to exist in the elastic hollow body member 18 is adjusted. As a result, the elastic hollow body member 18, which is of a thin-wall construction and therefore fills the existing hollow space or recess 15, presses from below against the printer's blanket or backing cloth 13, so that there exists an appropriate squeegee pressure. By virtue of the considered construction it is of no great importance if the squeegee 12, for instance, is not ground exactly straight or whether it tends to bend through because of its great length. The elastic hollow body member 18 readily accommodates itself to any deviations from the idealized form of the squeegee 12, so that in all instances there can be maintained an exactly constant squeegee pressure over the entire printing width. Any wear of the profile of the squeegee 12 is automatically compensated. A further advantage resides in the fact that any desired squeegee pressure can be adjusted at the pressure regulating valve 22 and with the aid of the manometer or pressure gauge 24 can be reproduced at any time with extreme accuracy.

If the circular screen 1 is raised after the rotary screen printing machine has stopped, then, the pressure is automatically switched over to the second switching position of the three-way valve unit 25, so that the pressure in the elastic hollow body member 18 momentarily drops.

It should be apparent from the foregoing detailed description, that the objects set forth at the outset to the specification have been successfully achieved.

We claim:

1. In a rotary screen printing machine including a substantially circular printing screen, a printer's blanket for supporting the material to be printed, said printer's blanket being positioned for travel below said circular printing screen, said circular printing screen contacting the material to be printed along a line of contact, and a stationary counterpressure means situated beneath said circular printing screen and below said printer's blanket, the improvement in said counterpressure means which enables said printer's blanket to deform slightly while still obtaining uniform printing, which comprises a counterpressure body member having a pair of spaced apart upstanding support ridge means, said support ridge means contacting against the underside of said printer's blanket and thus serving to support said printer's blanket, said pair of spaced apart upstanding support ridge means defining therebetween a recess means, said line of contact being aligned over said recess means so that as printing occurs at said line of contact, said printer's blanket can deform slightly downwardly into said recess means, an elastic hollow body member capable of being filled with a pressurized medium disposed within said recess means, and means for supplying said elastic hollow body member with a pressurized medium to exert an additional support against the underside of said printer's blanket.

2. The improvement defined in claim 1 wherein said elastic hollow body member is supported at all of its sides in said recess means with the exception of one free side which bears at the underside of said printer's blanket.

3. The improvement defined in claim 2 wherein said counterpressure body member has attached thereto, an intermediate layer formed of a flexible and wear-resistant material interposed between the free side of said elastic hollow body member and the underside of said printer's blanket in order to reduce the sliding resistance of the printer's blanket at said elastic hollow body member.

4. The improvement as defined in claim 1 wherein said elastic hollow body member is constructed in the form of a thin-walled hose member.

5. The improvement defined in claim 1 wherein said means for supplying a pressurized medium to said elastic hollow body member incorporates mechanism for controlling and regulating the pressure of said pressurized medium.