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(54) Tensioning system for printing devices

(57) The present invention is related to a tensioning system for printers comprising means for applying a tension force to a printing media along a contact zone characterised in that said means comprises a plurality of tensioning rolls (5) placed longitudinally next to each other, each roll being independently spring loaded (6) on each end.

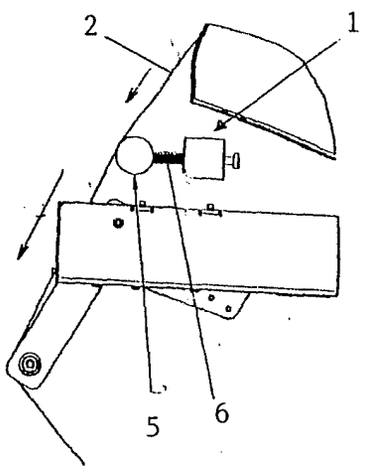

Fig. 2

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Description

Field of the invention

[0001] The invention is related to a system for tensioning printing media (paper, textile,...) on a printer, in particular on a large inkjet printer.

State of the art

[0002] Irregular expansion of the media may occur due to:

- expansion/contraction caused by a humidity or temperature change of the media,
- expansion caused by ink load,
- expansion caused by tension differences due to the media production process,

[0003] The media loop between the printer and the media collecting system is put under a certain tension, caused by the pulling force of the media collecting system (take-up system).

[0004] When using real media that expands, irregular expansion may result in a longer loop length on the edges of the media. The loop length is the length of the media between the printing position and the media collecting system, measured in the moving direction of the media.

[0005] Such a loop length difference causes the tension force applied by the media collecting system to be concentrated in the place of the media where the loop length is shorter. This creates tension loss in the areas of the media where the loop length is longer. The loop length difference may further cause bubbles in the media at the printing area, resulting in:

- printing quality loss due to irregular distance between print head and media, and
- head strikes, when the printing head is striking media bubbles.

When using media that does not expand or expands very little, a problem may still occur due to the bending of the media collecting roll. This roll gets heavier throughout the printing process, as more and more media are loaded on it. This causes bending of the collecting roll, leading to irregular tension in the printing media along the contact zone.

Document US5649890 is related to a draw roll for the transport of a material web, particularly a paper web in a web-fed printing machine. The draw roll has a circumference which increases from the centre to the edges, either continually or in small steps. Document DE10135124 shows a similar system. These systems however have the drawback that the tension force on one area of the media cannot be applied independently of another area along the length of the roll, and that the roll cannot be adapted to a variable width of the media to be printed.

Documents EP-A-1457347 and EP-A-0826480 show curved tension rolls used for stretching fabric materials which are to be printed. However, these documents do not mention the problem of compensating the bending of the media collecting roll.

Aims of the invention

[0006] The present invention aims to provide a tensioning system able to compensate irregular expansion or tension of media such that the media is kept flat at the printing position.

Summary of the invention

[0007] The present invention is defined by the appended claims.

[0008] The tensioning system according to the invention is particularly suitable for printing on extremely thin media, such as are presently used for example in the Digital Transfer Printing technique.

Short description of the drawings

[0009] Fig. 1 represents two views of a printing device comprising a tensioning system according to the present invention.

[0010] Fig. 2 represents a detailed view of the tensioning system.

[0011] Fig. 3 represents an embodiment with three rolls. Fig 3a shows three plane views. Fig. 3b shows a 3-D view.

Detailed description of the invention

[0012] Figure 1 shows two views of a printing device comprising a tensioning system 1 according to a first embodiment of the present invention. One can see the media 2 being guided from the print area 3 towards the media collecting system 4 which is basically a roll onto which the printed media is wound. Figure 2 shows a detail of the first embodiment. As can be seen in Fig.3, the tensioning system of the first embodiment comprises a number of tension rolls 5, which are mounted next to each other longitudinally. They are placed in the direction essentially perpendicular to the media travel direction defined by the arrows (fig. 2). Each tension roll is independently spring loaded on both ends. Springs 6 are mounted for this purpose at each end of each tension roll.

[0013] The case is shown, wherein three tension rolls are present. In the preferred case, each tension roll, except for the one in the middle, can be adjusted in the left-right direction (see fig. 3b, arrow 10). This adjustment can be used to fit the system to the width of the media used. Also in the case of more than three rolls,

the system of the invention preferably has at least the outer rolls being movable in longitudinal direction.

[0014] Both the left and the right outside tension roll may have a higher spring load on the outsides. This is because the effect of irregular media expansion shows up mainly on the outside edges of the media.

[0015] The total system can be withdrawn backward for media loading. It can be adjusted in the front/rear direction (arrow 11) to adjust the offset spring force on the tension rolls.

[0016] The tension rolls can be fixed around their length axis, allowing the media to slide over, or they can be mounted on bearings, allowing them to roll with the media movement.

[0017] The tension rolls of the system of the invention each give additional, independent local tension on the media area covered by the width of the tension roll. This compensates for the differences in the loop length over the width of the media. By doing so, all irregular media expansion is absorbed at the invention system, thereby keeping the media in the print area flat.

[0018] In particular, the system of the invention allows to compensate for the bending of the media collecting roll, as described above. An alternative embodiment is particularly useful for that purpose. In this case, there is only one tension roll, made of a sufficiently flexible material, that causes the roll to bend slightly due to the pressure exerted by the media onto the roll. In this way the tension roll may obtain the same shape as in the above-mentioned embodiments, thus yielding the same effect. The material of the one flexible roll is chosen such that it is capable of compensating for the bending of the collecting roll. The one flexible roll may be mounted so that it can rotate, or it can be mounted in a fixed way. The flexible roll preferably has a fixed diameter.

[0019] The system of the invention is especially advantageous for printers used to print on extremely thin media, such as printers used for Digital Transfer Printing.

Claims

1. Tensioning system (1) for printers comprising means for applying a tension force to a printing media along a contact zone **characterised in that** said means comprises a plurality of tension rolls (5) placed longitudinally next to each other, each roll being independently spring loaded (6) on each end.

2. Tensioning system according to claim 1 comprising three rolls (5), wherein the middle roll is fixed in longitudinal direction, and the other two rolls are adjustable in longitudinal direction.

3. Tensioning system according to claim 1, wherein said rolls (5) are fixed around their length axis.

4. Tensioning system according to claim 1, wherein said rolls (5) can rotate around their length axis.

5. Tensioning system comprising means for applying a tension force to an essentially non-expanding printing media along a contact zone **characterised in that** said means consists of one roll, said roll being made of a flexible material, wherein said roll is arranged to bend in order to compensate for the bending of a media collecting roll.

6. Tensioning system according to claim 5, wherein said one roll is fixed around its length axis.

7. Tensioning system according to claim 5, wherein said one roll can rotate around its length axis.

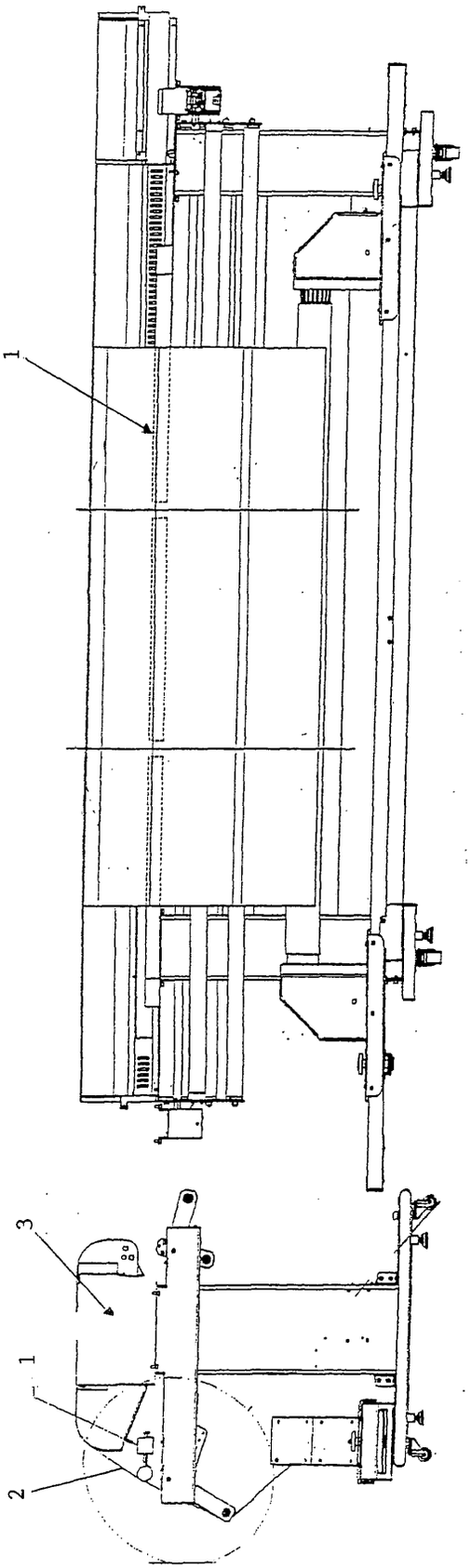

Fig. 1

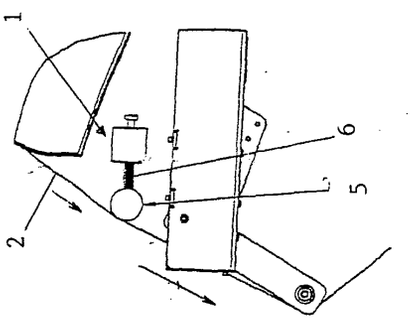

Fig. 2

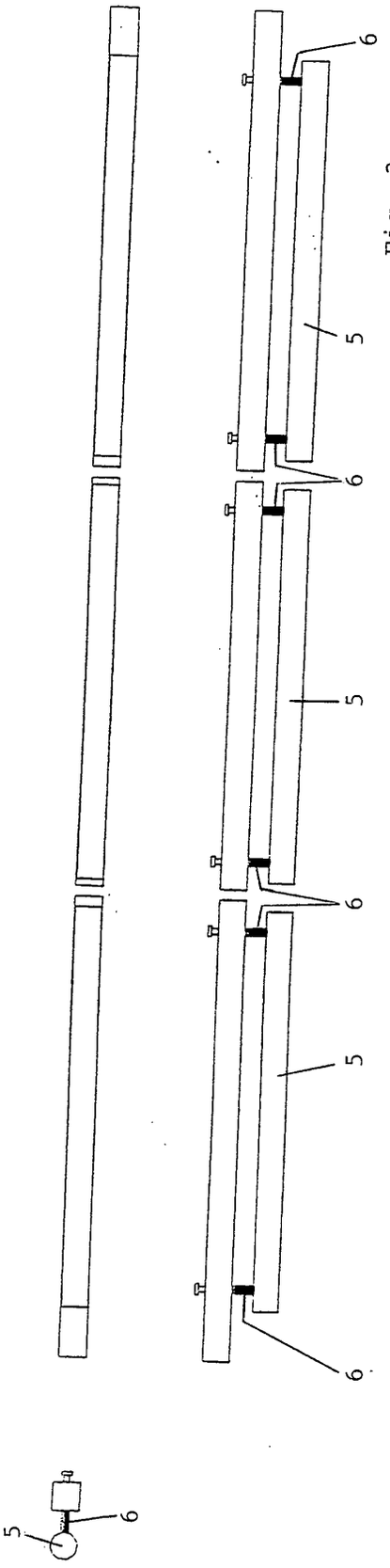

Fig. 3a

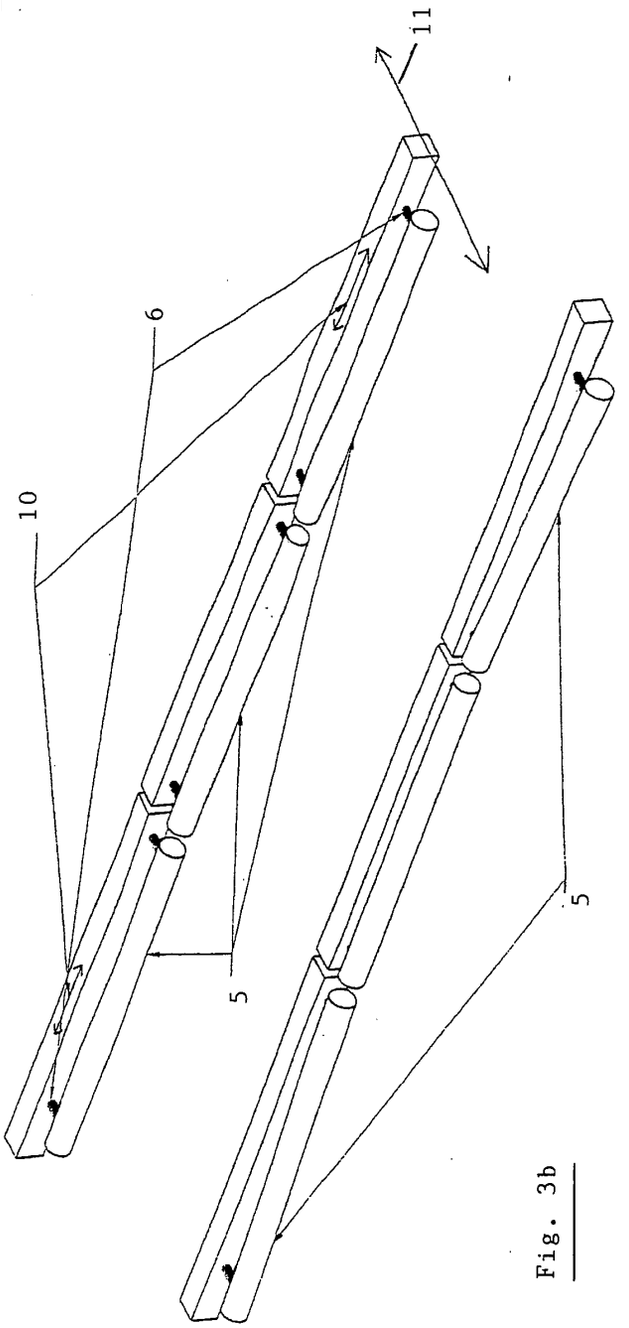

Fig. 3b

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EUROPEAN SEARCH REPORT

Application Number
EP 05 44 7053

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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B41J
B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	15 June 2005	Joosting, T

CATEGORY OF CITED DOCUMENTS

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