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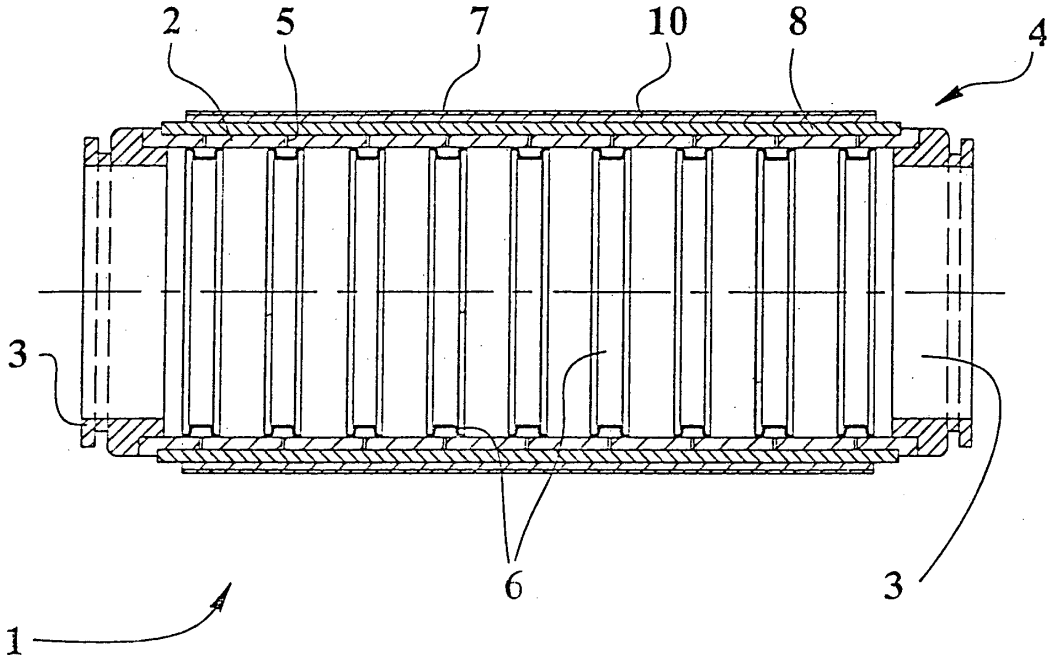
(54) Printing roll with internal pressurized fluid supply

(57) A printing roll comprises a tubular cylindrical support (2) for a printing element (4) and whose ends have respective assembly flanges (3) to assembly said assembly flanges (3) to rotary printing machine. The cylindrical support (2) is provided with a plurality of through holes (5) in flow communication with a plurality of ducts (6), internal to the cylindrical support (2), for a pressurized fluid.

The adduction of the fluid in pressure provokes a light elastic expansion of the portion of the printing element (4) faced to the cylindrical support (2) allowing the low friction movements of the printing element (4) on the cylindrical support (2). The stop of the adduction cause the finding on the cylindrical support (2) of the printing element (4) with consequent removable blocking of this latter.

FIG.1



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Description

[0001] The present invention refers to the technical field concerning the industrial printing. In particular the invention refers to a roll for decorative, monochromatic and colour printing of supports having smooth or irregular printing surfaces, particularly for ceramic tiles, cardboard, and elements made of glass, metal, plastic, synthetic materials and for conglomerate or similar.

[0002] A known decorative printing roll, has a rigid cylindrical support, consisting in a metallic tubular element fit for supporting and for fixing a printing element constituted by the matrix. Such known rolls can comprise an eventual elastic element interposed between the cylinder and the matrix. To the cylinder ends respective protruding flanges are fixed, fit for assembling the roll to a rotative printing machine. The external diameter of such protruding flanges is bigger with respect to the cylinder diameter in order to supply lateral stops to the printing element preventing some undesired axial movements.

[0003] A disadvantage of such known rolls, is that the printing element or the matrix are difficult to be inserted on the cylindrical support and their removal is difficult or impossible to be performed without the complete destruction of the printing element.

[0004] Another disadvantage of some of the known rolls consists in the fact that, because of the difficulties of insertion and removal, the substitution of the matrix requires the shipment of the rolls in specialized centres causing high expenses for the shipment of the entire rolls and for the substitution of the matrix or the complete printing element.

[0005] Other disadvantage is that the known rolls are extremely heavy, because of the entire metallic construction.

[0006] An object of the present invention is to propose a printing roll, as example for floor tiles, slabs, woven, cardboards and conglomerates, allowing an easy and fast substitution of the printing element is site the location of its use and without equipments and without specialized staff.

[0007] Another object is to propose a light and manageable roll also during the assembly and disassembly from the printing machine and substitution of the printing elements. Another object is to propose a roll that allows the disassembly and the partial or total re-use of the printing element. Other object is to propose a roll of simple of and economic realization and sure to operate.

[0008] The above-mentioned objects are obtained according to the content of the claims. The characteristics of the present invention are highlighted in the following with particular reference to the attached drawings, in which:

- the figure 1 represents a schematic view of a longitudinal section of the printing roll of the present invention in an assembly condition of a printing element;
- the figure 2 represents an enlarged partial view of a detail of the roll of figure 1.

[0009] With reference to figures 1 and 2, 1 indicates the printing roll object of the present invention comprising a cylindrical tubular support 2 whose extremities presents respective flanges 3 for the assembly to a rotary printing machine.

[0010] The tubular cylindrical support 2 is fit for supporting a printing element 4, as an example of the type to carrying out the ink printing on more or less flat and more or less smooth surfaces of ceramic floor tiles, slabs, paper, cardboard, woven, conglomerates, etc.

[0011] The tubular cylindrical support 2 is made of composite material preferably in carbon fiber in epoxy or polyurethane resin matrix.

[0012] The invention provides that the material of tubular support 2 can comprise boron fibres, aramidic and/or of glass or other reinforced fibres, in addition or substitution of carbon fibres.

[0013] The assembly flanges 3 are made of metal, preferably aluminium alloy, or synthetic material and/or composite and presents an external diameter approximately equal or lower to that of the cylindrical support 2.

[0014] The flanges 3 are glued to the tubular cylindrical support 2 by means of resin, preferably epoxy resin, spread in the L shaped ring zone, of each flange, provided to finding the respective extremity of cylindrical support 2.

[0015] During the gluing, the flanges 3 are blocked in one template in order to assure the correct mutual positioning. Subsequently to the gluing, the external surface of cylindrical support 2 is rectified in order to guarantee the correct orientation with respect to the flanges and a good surface finishing.

[0016] The extremities of the external surface of tubular cylindrical support 2 have corresponding ring prominences 11 that form shoulders fit to find the lateral edges of the printing element 4 in order to prevent undesired transversal movements during the operation.

[0017] The invention provides that prominences 11 can be realized or finished by rectification.

[0018] The tubular cylindrical support 2 has a plurality of through holes 5 that radially cross the tubular wall thereof.

[0019] Such through holes 5 are in flow communication with a plurality of ducts 6, internal to cylindrical support 2 fed with pressurized fluid consisting, as example, in compressed air, through valve means of known type and not illustrated, from a source consisting in an air tank of a compressor. The adduction of the compressed air in the ducts 6 and through holes 5 provokes an increase of the pressure between the cylindrical support 2 and the printing element 4 causing a light elastic expansion of the portion of this last element 4 faced to the cylindrical support 2. Such expansion of the printing element 4, allows the low friction movements thereof on the cylindrical support 2.

[0020] The stop of the adduction causes the elastic

withdrawal of the printing element 4 and its findinging with the cylindrical support 2 with consequent mutual and removable blocking.

[0021] The ducts 6 are ring-shaped and are associated to the inner face of cylindrical support 2 in correspondence of planes orthogonal to such support 2, the through holes 5 are disposed on such plans.

[0022] The ducts 6 can consist in synthetic material tubes glued within the cylindrical support 2 and the holes can be carried out in such way to put the inside of the tubes directly in communication with the outside through the cylindrical wall of support 2.

[0023] Preferably the ducts 6 can be realized through an open profile, for example with Ω section as represented in figures 1 and 2, glued to the internal surface of the support 2 so that this last one constitutes a closing portion thereof in which holes 5 are provided.

[0024] In alternative to the ring shape of the ducts, the invention provides that they can be associated to the inner face of cylindrical support 2 in correspondence of spiral lines or straight generatrix lines of such support 2 and the through holes 5 are disposed along such spiral or generatrix lines.

[0025] Each ring-shaped duct 6 is separately connected to the source of the pressurized fluid through corresponding tubes, of known type and not illustrated, connected to corresponding valve means for controlling of the compressed air adduction.

[0026] The individual connection of each duct 6, prevents the outflow of the air from holes 5 engaged by a portion of the printing element 4 when many other holes are disengaged.

[0027] Each through hole 5 has an inner opening approximately cylindrical shaped with diameter ranging between 0.1 mm and 10 mm approximately and the plurality of through holes 5 has a total opening ranging between 0.1% and 10% of the lateral surface of cylindrical support 2.

[0028] The compressed air presents a static pressure ranging between 4 atmospheres and 12 atmospheres; the tank of the source and the separate feeding of ducts 6 contribute to maintain the dynamic pressure at a value not excessive lower to that of the static pressure.

[0029] The printing element 4 comprises, starting from the outside, at least a printing matrix 7, an elastic means 10 and a sleeve 8 having a length slightly higher to those of the matrix and of the elastic means. The printing matrix 7, the elastic means 10 and the sleeve 8 are mutually fixed in a fixed or removable way.

[0030] The printing matrix 7 is made of elastic material as, for example, silicone or other elastomer, and it is tubular shaped with the external face fit to be engraved for the printing.

[0031] The elastic means 10, interposed between the printing matrix 7 and the sleeve 8, are made of foam rubber or other spongy and elastic material.

[0032] The sleeve 8, fit to find the external face of cylindrical support 2, is made of airtight and waterproof material. The material of the sleeve 8 is, for example, synthetic flexible and at least lightly elastic, reinforced with fibres or woven. Preferably both the faces, inner and external, of the sleeve are smooth and waterproof with the fibres or the woven embedded within the material in order to avoid the impregnation thereof with ink, dissolvent or other liquids.

[0033] The operation of roll 1, taken apart from the printing machine, provides that in order to unthread or to thread the printing element 4 from cylindrical support 2, valve means are operated for the adduction of the compressed air which forms an air cushion between the cylindrical support 2 and the printing element 4, this latter being lightly elastically expanded by the air pressure.

[0034] The air cushion reduces nearly to zero the friction allowing an easy manual moving of the printing element 4 also when this last one is nearly completely unthread with respect to the cylindrical support.

[0035] The main advantage of the present invention is to provide a printing roll, for example for floor tiles, slabs, woven, cardboards and conglomerates, allowing an easy and fast replacement of the printing element in site and without the intervention of equipment and specialist staff.

[0036] Other advantage is to supply a light and manageable roll also during the operations of assembly and disassembly from the printing machine and substitution of the printing elements.

[0037] Another advantage is to propose a roll allowing the disassembly of the printing element without causing the damaging, for re-use of the engraved matrix or a part of the printing element the same.

[0038] Another advantage is to provide a roll of simple and economic realization and of sure operation.

Claims

1. Printing roll comprising a tubular cylindrical support (2) for a printing element (4) and whose ends are provided with respective assembly flanges (3) to assembly to a rotary printing machine, said roll (1) being **characterized in that** the cylindrical support (2) is provided with a plurality of through holes (5) in flow communication with a plurality of ducts (6) internal to the cylindrical support (2) for a pressurized fluid whose adduction provokes a light elastic expansion of the portion of the printing element (4) faced to the cylindrical support (2) allowing the low friction movements of the printing element (4) on the cylindrical support (2); the stop of the adduction causing the finding on the cylindrical support (2) of the printing element (4) with consequent removable blocking of this latter.

2. Roll according to claim 1 **characterized in that** the ducts (6) are ring shaped, are associated to the inner face of the cylindrical support (2) in correspondence with planes oriented in an orthogonal manner in re-

spect to such support (2) and the through holes (5) are disposed on such planes.

3. Roll according to claim 1 **characterized** it that the ducts (6) are associated to the inner face of the cylindrical support (2) on spiral lines or straight generatrix lines of such support (2) and the through holes (5) are disposed along such spiral lines or straight generatrix lines.

4. Roll according to claim 1 **characterized in that** each duct (6) is separately connected to a source of the pressurized fluid.

5. Roll according to claim 1 **characterized in that** each through hole (5) presents an inner opening having diameter ranging between 0.1 and 10.0 mm approximately.

6. Roll according to claim 1 **characterized in that** the plurality of through holes (5) presents a total opening ranging between 0.5% and 15% of the lateral surface of cylindrical support (2).

7. Roll according to claim 1 **characterized in that** the pressurized fluid consists in air compressed at a static pressure ranging between 4 atmospheres and 12 atmospheres.

8. Roll according to claim 1 **characterized in that that** the printing element (4) comprises at least a tubular shaped printing matrix (7), made of elastic material, having the face fit to be impressed for the printing.

9. Roll according to claim 8 **characterized in that** the printing matrix (7) is fixed to a sleeve (8) made of fluid-tight material and at least lightly elastic and fit to find the external face of the cylindrical support (2).

10. Roll according to claim 9 **characterized in that** the printing element (4) comprises an elastic means (10) interposed between the printing matrix (7) and the sleeve (8).

11. Roll according to claim 10 **characterized in that** the printing matrix (7) is made of silicone material or other elastomer, the elastic means (10) is made of foam rubber or other spongy material, and the sleeve (8) is made of flexible synthetic material and at least lightly elastic, reinforced with fibres or woven.

12. Roll according to claim 1 **characterized in that** the tubular cylindrical support (2) is made of composite material.

13. Roll according to claim 12 **characterized in that** the tubular cylindrical support (2) is made of material comprising carbon, kevlar, boron, aramidic and/or glass fibres, in epoxy or polyuretanc resin matrix.

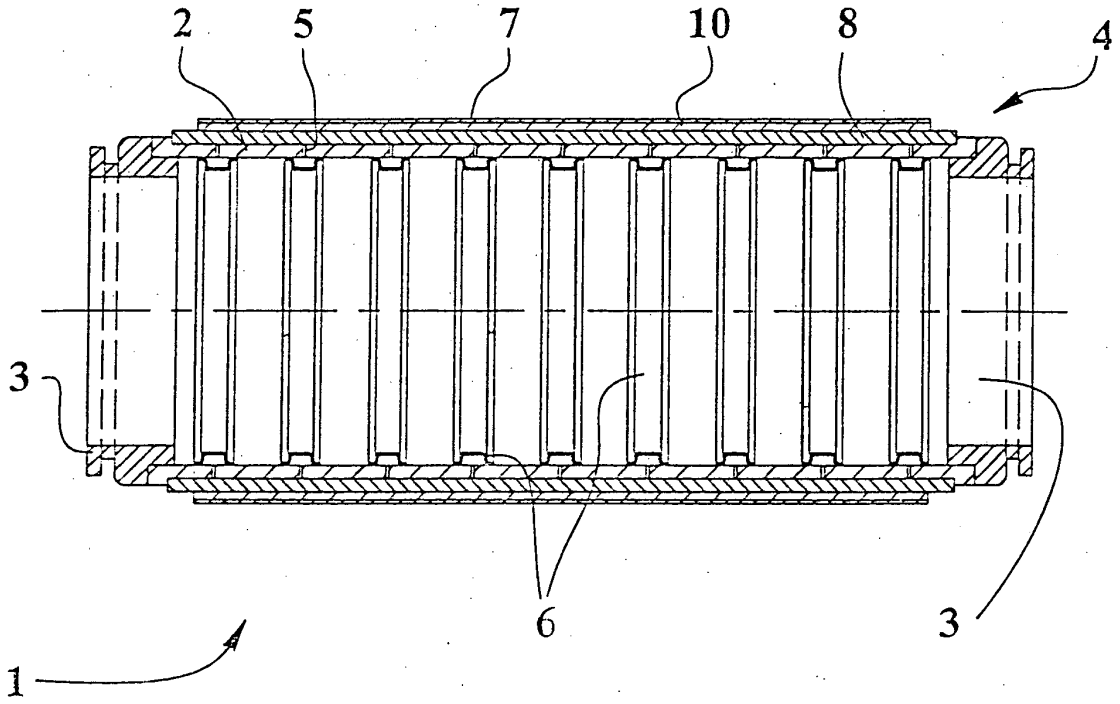
14. Roll according to claim 1 **characterized in that** the assembly flanges (3) are made of metal or synthetic material and/or composite material.

15. Roll according to claims 13 and 14 **characterized in that** the flanges (3) are glued at the tubular cylindrical support (2).

16. Roll according to claims 1 or 15 **characterized in that** the external surface of the tubular cylindrical support (2) is rectified.

17. Roll according to claim 16 **characterized in that** the ends of the external surface of the tubular cylindrical support (2) have respective ring prominences (11) fit to find the edges of the printing element (4).

FIG.1



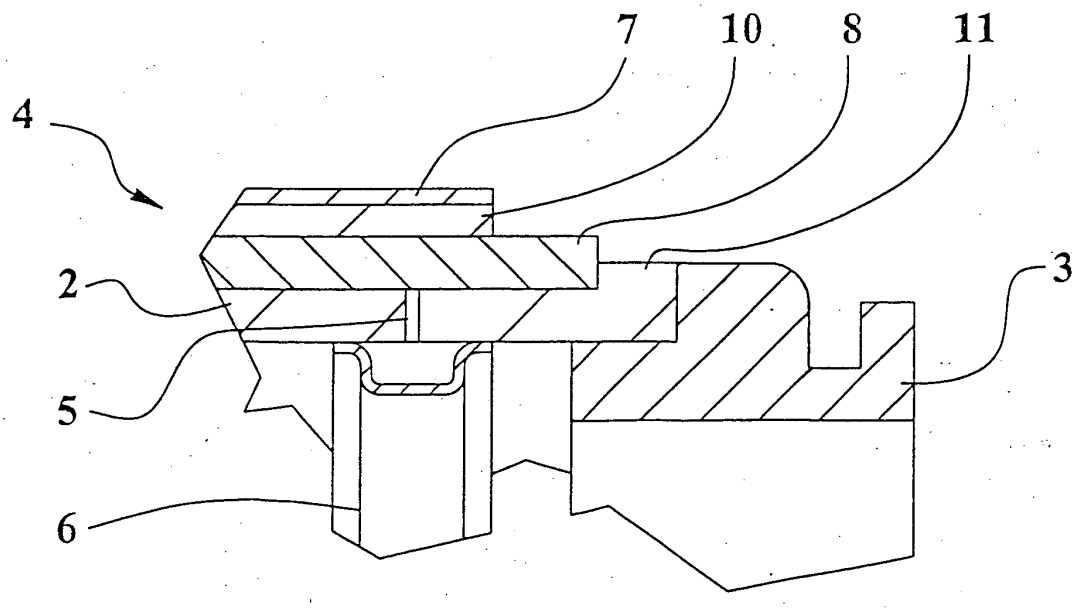


FIG.2

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EUROPEAN SEARCH REPORT

Application Number
EP 05 01 9719

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	8 November 2005	Balsters, E

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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