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(71) Applicant: **Analco Auxiliar Calzado, S.A.**
03293 Elche Alicante (ES)

(72) Inventor: **FELIPE GARCIA, Juan Ricardo**
03420 Alicante (ES)

(74) Representative: **Ungria López, Javier**
Avda. Ramón y Cajal, 78
28043 Madrid (ES)

(54) **PAD PRINTING MACHINE**

(57) The invention relates to a pad printing machine (1), of the type comprising a frame (2) including a supporting element (3) for an image plate (4), a rotary pad (5), and an inkwell (6) for inking the pad (5), as well as comprising a rotary support (7) provided with rotary means for securing the object (8) to be pad printed.

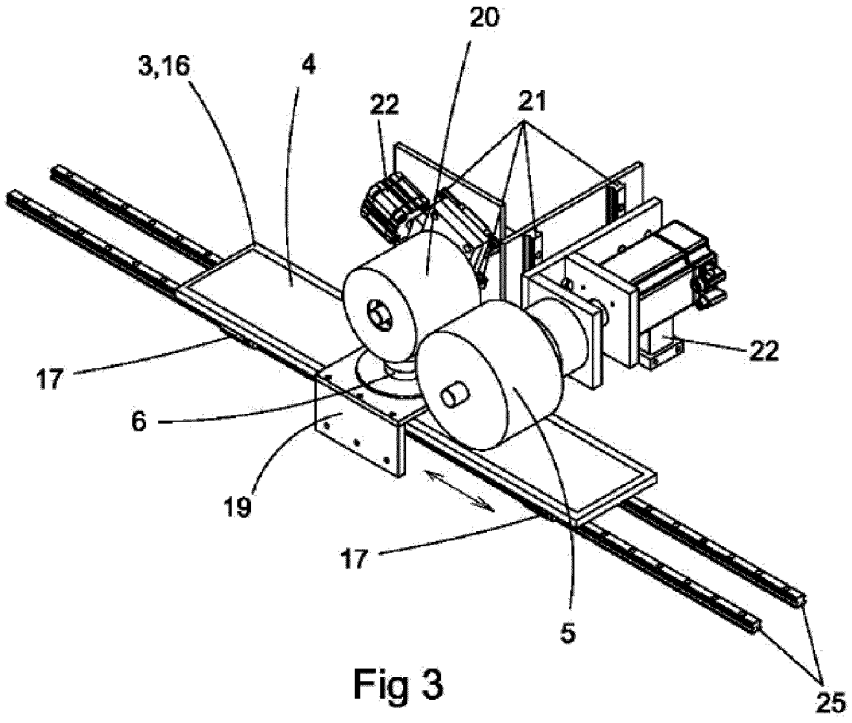

Fig 3

EP 3 473 445 A1

Description

OBJECT OF THE INVENTION

[0001] The present invention relates to a pad printing machine which enables the rotary application of the pad printing onto objects, minimising the appearance of cuts in the continuity of the printing performed.

BACKGROUND OF THE INVENTION

[0002] Pad printing is a reproduction process that is performed by means of pad printing machines comprising a frame with a supporting element (flat, or cylindrical usually) wherein a metal or plastic image plate can be mounted, precisely where the image to be pad printed is engraved configuring a rotogravure. Ink is applied to this image plate by means of an inkwell, usually provided with a doctor blade, followed by a silicone pad or a pad made of similar material, usually cylindrical, that presses onto the engraving of the plate collecting the ink from the rotogravure and transferring it to the part to be pad printed. It is a highly used system for marking objects.

[0003] The image plates are usually made of photopolymer or steel, the photopolymer plates being more common since they are easier to create, even being internally developed, while those made of steel frequently require the intervention of specialised companies.

[0004] However, the results from the printing of current machines have cuts in the printing of objects with volume which require printing on several sides, such as for example platforms or soles of footwear. This implies a drawback that is remedied with the use of the pad printing machine of the invention.

DESCRIPTION OF THE INVENTION

[0005] The pad printing machine of the invention has a configuration which enables a continuous application of the pad printing, minimising or directly preventing the appearance of any type of joint, cut or discontinuity in the printing performed. It is applicable to any object to be pad printed which has a volume, for example soles or platforms of footwear, bottles, toys, etc.

[0006] The machine is of the type comprising a frame with a supporting element for an image plate, supporting element being understood as an element or support that enables the interchangeable assembly. It also comprises a rotary pad and an inkwell for inking the pad, which, according to the invention, further comprises a rotary support provided with rotary means for securing the object to be pad printed.

[0007] Thus, the combined rotary movement of the pad and the object to be pad printed is achieved, obtaining a printing that is continuous and with a minimal number of cuts in the printing on the three-dimensional outline of the object in the area in contact with the pad.

DESCRIPTION OF THE DRAWINGS

[0008]

Figure 1.- Shows a perspective view of the machine of the invention.

Figure 2.- Shows a side view of the machine of the invention.

Figure 3.- Shows a detailed view of the machine of the invention.

PREFERRED EMBODIMENT OF THE INVENTION

[0009] The pad printing machine (1) of the invention is of the type that comprises: a frame (2) with a supporting element (3) -in this case a flat sheet-for an image plate (4) -made of photopolymer in this specific case-, a rotary pad (5) - a silicone roller in this case- and an inkwell (6) for inking the pad (5) the machine (1) of which, according to the invention, also comprises a rotary support (7) (see figs 1 and 2) provided with a rotary means for securing the object (8) to be pad printed.

[0010] The rotary support (7) comprises a first rotation shaft (7a) parallel to the second rotation shaft (5a) of the rotary pad (5), which is cylindrical, such that a cylindrical printing is performed. Alternatively, although it is not shown in the figures, the first rotation shaft (7a) of the rotary support (7) can be not parallel to the second rotation shaft (5a) of the rotary pad (5), such that printing of other shapes may be performed, adapted to the contour of the object (8) (for example conical if the shafts are convergent and the pad (5) is conical). Furthermore, it has been envisaged that the rotary support (7) preferably comprises a last (9) for securing the object (8) to be pad printed in order to improve the securing thereof.

[0011] The rotary support (7) is mounted in the frame (2) through collapsible means over the actuation area of the pad (5). Specifically, in the example shown in the figures, the rotary support (7) comprises arms (11) facing each other and a joint (12) for attaching to the frame (2) in order to enable the collapsing thereof, the collapsible means linking the rotary support (7) and the frame (2). Two semi shafts (14, 14a) (see fig 1) for securing the object (8) are arranged in said arms (11) (in this case through the last (9)), at least one of which comprises a rotary actuation (15). This configuration is simple, since it only requires two support points for the object (both semi shafts) and the collapsing joint (12). The rotary actuation (15) ideally comprises a first motor (15a) and a first belt (15b), also being a simple configuration. In turn, the collapsible means comprise, in this non-limiting example of the invention, cylinders (10) (pneumatic and/or hydraulic), which enables a suitable actuation speed.

[0012] The supporting element (3) for the image plate (4) in this example comprises a flat sheet (16) (see fig 3) which is mounted in a carriage (17) provided with back-and-forth linear actuation means along guides (25) in the actuation area of the inkwell (6) (underneath it). Said

back-and-forth linear actuation means comprise a second motor (18) and a second belt (23) (see fig 2). This configuration facilitates the changing of the image plate (4) with respect to cylindrical supporting elements, and a better inking.

[0013] The inkwell (6) is preferably arranged in a fixed support (19) on the carriage (17) which carries the sheet (16) of the supporting element (3) of the image plate (4), such that it starts to prime the image plate (4) with the back-and-forth movement of the carriage (17). This causes the ink to be deposited by gravity.

[0014] The arrangement of a cleaning roller (20) for the pad (5) has also been envisaged in the machine (1) (see fig 1 and 3). Said cleaning roller (20) is made of drying material and is in contact with the pad (5) following from the application area of the printing in order to dry the paint residues after the printing and before the next inking. The pad (5) and/or the cleaning roller (20) are mounted in the frame through adjustable sliders (21) (see fig 3) in order to precisely adjust the position and contact pressure thereof during the operations through linear actuators (22).

[0015] The machine is complemented by an obvious electronic and/or electromechanical controller, not shown, which controls the operations of the different elements.

[0016] Having sufficiently described the nature of the invention, it is indicated that the description of the same and of the preferred embodiment thereof must be interpreted as not limiting, and that covers the entirety of the possible variants of an embodiment that are deduced from the contents of the present specification and of the claims.

Claims

1. A pad printing machine (1), of the type comprising a frame (2) including a supporting element (3) for an image plate (4), a rotary pad (5), and an inkwell (6) for inking the pad (5); **characterised in that** it comprises a rotary support (7) provided with rotary means for securing the object (8) to be pad printed.

2. The pad printing machine (1) according to claim 1 **characterised in that** the supporting element (3) comprises a flat sheet.

3. The pad printing machine (1) according to any of the preceding claims **characterised in that** the rotary support (7) comprises a first rotation shaft (7a) parallel to the second rotation shaft (5a) of the cylindrical rotary pad (5).

4. The pad printing machine (1) according to any of claims 1 or 2 **characterised in that** the rotary support (7) comprises a first rotation shaft (7a) not parallel to the second rotation shaft (5a) of the cylindrical rotary pad (5).

5. The pad printing machine (1) according to any of the preceding claims **characterised in that** the rotary support (7) comprises a last (9) for fastening the object (8) to be pad printed.

6. The pad printing machine (1) according to any of the preceding claims **characterised in that** the rotary support (7) is mounted in the frame (2) through collapsible means over the actuation area of the pad (5).

7. The pad printing machine (1) according to claim 6 **characterised in that** the rotary support (7) comprises arms (11) facing each other and a joint (12) for attaching to the frame (2) for collapsing, the collapsible means linking the rotary support (7) and the frame (2); comprising in said arms (11) two semi shafts (14, 14a) for securing the object (8), at least one of which comprises a rotary actuation (15).

8. The pad printing machine (1) according to claim 7 **characterised in that** the rotary actuation (15) comprises a first motor (15a) and a first belt (15b).

9. The pad printing machine (1) according to any of claims 6 to 8 **characterised in that** the collapsible means comprise cylinders (10).

10. The pad printing machine (1) according to any of the preceding claims **characterised in that** the supporting element (3) for the image plate (4) comprises a flat sheet (16) that is mounted in a carriage (17) provided with back-and-forth linear actuation means in the actuation area of the inkwell (6).

11. The pad printing machine (1) according to claim 10 **characterised in that** the back-and-forth linear actuation means comprise a second motor (18) and a second belt (23).

12. The pad printing machine (1) according to any of claims 10 or 11 **characterised in that** the inkwell (6) is arranged in a fixed support (19) over the carriage (17) which carries the sheet (16) of the supporting element (3) of the image plate (4).

13. The pad printing machine (1) according to any of the preceding claims **characterised in that** it comprises a cleaning roller (20) for the pad (5).

14. Pad printing machine (1) according to claim 13 **characterised in that** the pad (5) and/or the cleaning roller (20) are mounted in the frame through adjustable sliders (21) and linear actuators (22).

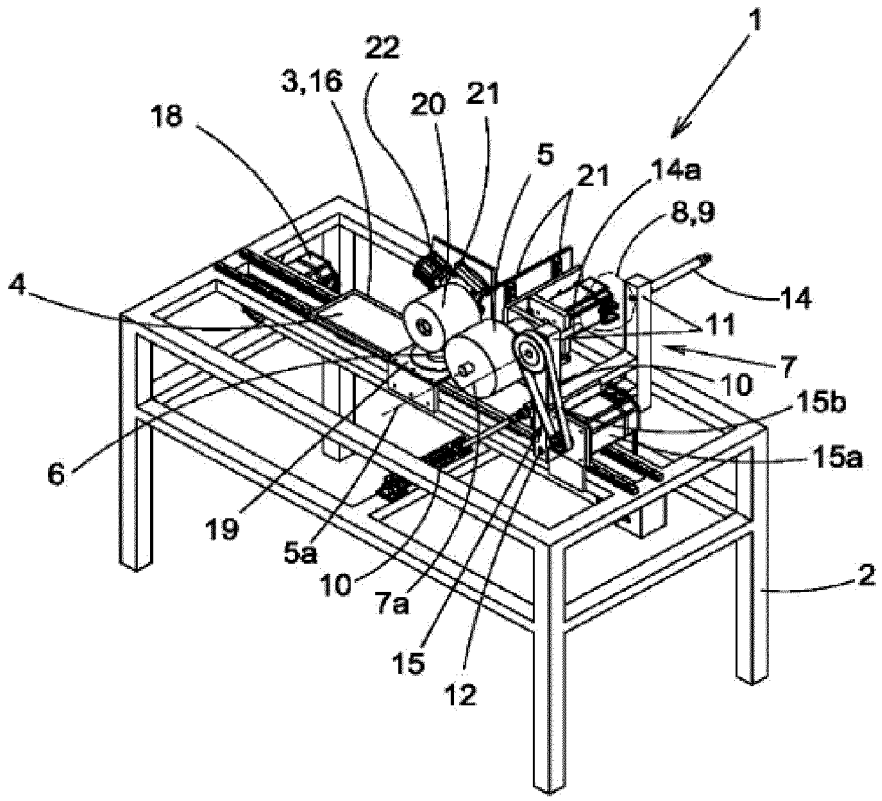
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Fig 1

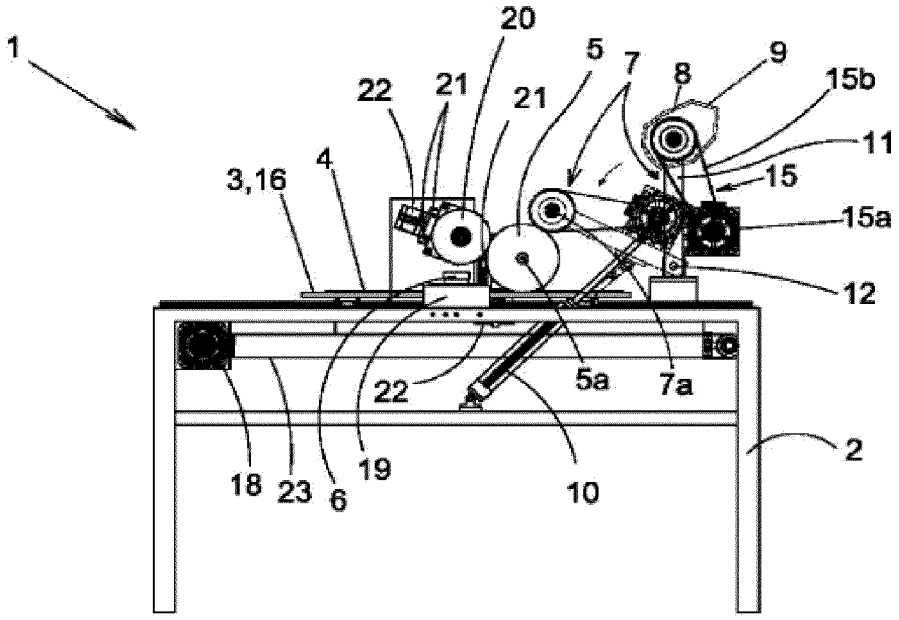
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Fig 2

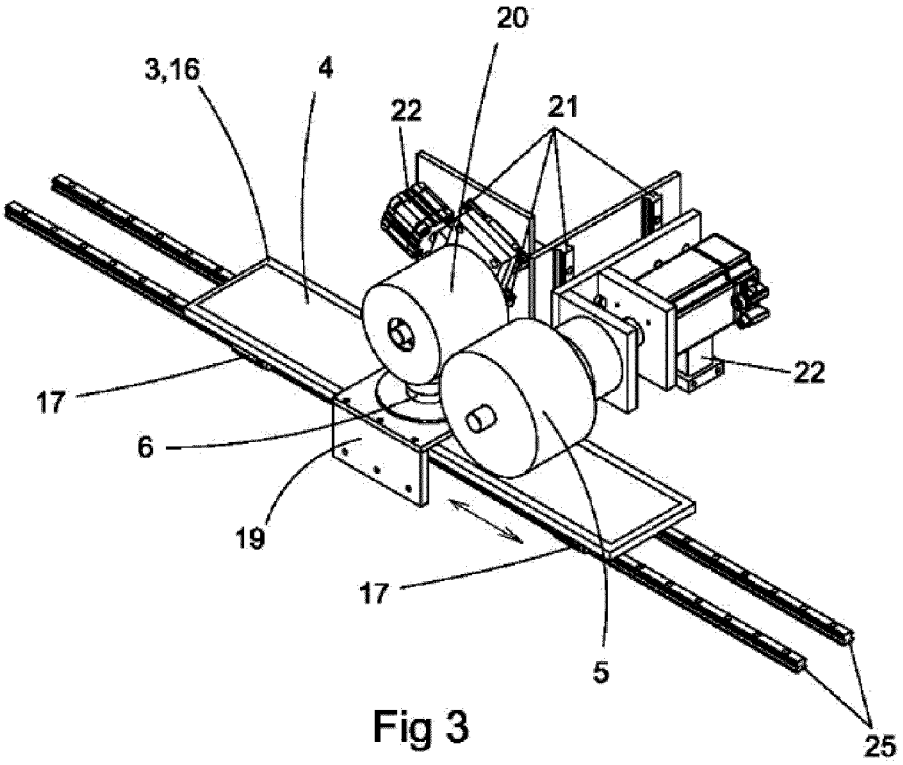

Fig 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2017/070451

A. CLASSIFICATION OF SUBJECT MATTER

B41F17/00 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B41F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2842747 A1 (TECA PRINT AG) 04/03/2015, paragraphs [0031- 0046]; figures.	1-5, 10-14
A	US 2006213380 A1 (REINHOLDT HOLGER) 28/09/2006, paragraphs [0013 - 0027]; figures.	1, 10-14
A	KR 101277702B B1 (HYOCHANG MACHINERY CO LTD) 20/06/2013, Abstract from DataBase EPODOC. Retrieved from EPOQUE; figures.	1-14
A	DE 102011078532 B3 (TAMPOPRINT AG) 26/07/2012, paragraphs [0020 - 0022]; figures.	1-14

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance.
"E" earlier document but published on or after the international filing date
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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"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 documents , such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15/09/2017	**(20/09/2017)**
Name and mailing address of the ISA/ OFICINA ESPAÑOLA DE PATENTES Y MARCAS Paseo de la Castellana, 75 - 28071 Madrid (España) Facsimile No.: 91 349 53 04	Authorized officer G. Villarroel Álvaro Telephone No. 91 3498571

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/ES2017/070451

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		EP2540502 A3	10.04.2013

Form PCT/ISA/210 (patent family annex) (January 2015)