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(54) Title: INTERNAL INK MANIFOLD AND INK CHANGING METHOD

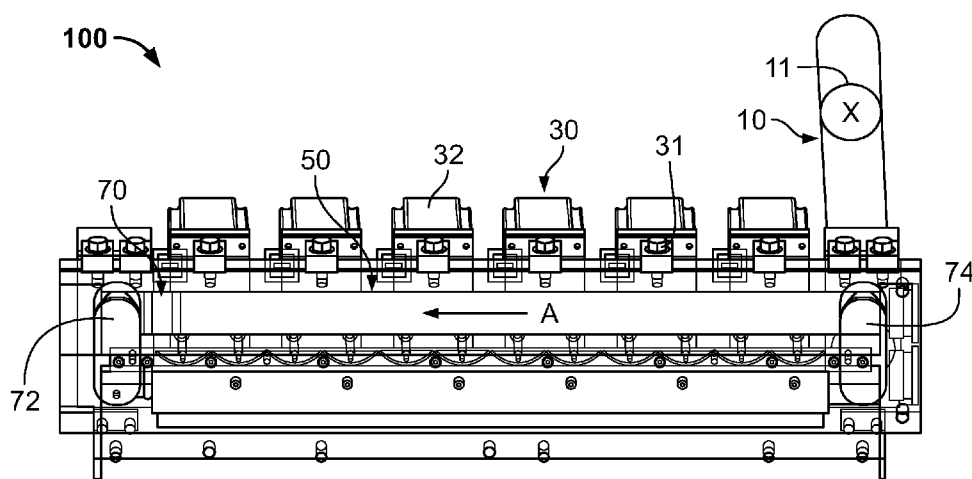


FIG. 1

(57) Abstract: An inking system (100) for a printing press is provided, including a structural member (20); an internal ink manifold (60) housed in the structural member (20); a shuttle inside (70) the internal ink manifold (60) and movable along a length of the internal ink manifold (60); and a plurality of ink supply sources (10, 12), a first ink supply source (10) for connection to a first end of the internal ink manifold (60) and a second ink supply source (12) for connection to a second end of the internal ink manifold (60).



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Internal Ink Manifold and Ink Changing Method

CROSS REFERENCE TO RELATED APPLICATION

[0001] Priority is hereby claimed to U.S. Provisional Application No. 62/491,448 filed April 28, 2017, and hereby incorporated by reference herein.

BACKGROUND

[0002] The present invention relates generally to inking devices and ink metering systems for printing presses.

[0003] As currently known in the art, ink metering systems utilize ink manifolds external to the support structure of the system to distribute the ink supply. When there is an open ink fountain, a manifold with a plurality of orifices resides over an ink trough separate from the support structure. A valve between the main ink supply and the manifold is open or closed to control to maintain a desired level of ink in the trough. When there is a closed ink metering device, ink is distributed from an external ink manifold to the metering device or groups of metering devices (packs) via a series of fittings and hoses. The metering packs are then mounted to the structural member for distribution of ink to the print unit.

[0004] Cleaning the external manifold is difficult and time consuming. To compensate for this, color specific manifold and distribution pumping is often utilized. A manifold is dedicated to one color. Duplicate complex ink distribution networks are used for each alternate color.

[0005] In open ink fountains ink colors may be changed, but the process is messy, time consuming and manual in nature. In addition, hand cleaning an internal manifold wastes ink and is labor intensive.

BRIEF SUMMARY OF THE INVENTION

[0006] External manifolds are added to components of ink delivery systems which increase the cost and complexity of the system. In closed systems, ink in the manifold and distribution hoses is pressurized. Hoses expand under pressure and store energy (expanded elastomer) and ink

(increased volume in expanded hoses). During idle periods, a valve between the manifold and main ink supply is closed trapping the pressurized ink. The stored energy in the hoses is relieved via ink leakage through the metering device. This results in startup issues, for example, when there is too much ink in the system, or increased maintenance, for example, ink on the floor. In addition, the assembly of the manifold, fittings and hoses is difficult to clean a change in ink color within a unit is desired.

[0007] Rigid piping has been considered to address the potential for leakage. This solution is not practical due to increased complexity and cost. A rigid ink distribution system would increase the difficulty of cleaning for color change.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] A preferred embodiment of the present invention will be elucidated with reference to the drawings, in which:

[0009] Figs. 1 to 5 show an inking system with an internal manifold and a shuttle according to the present invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

[0010] Figs. 1 to 5 show an internal manifold 60 with a shuttle 70 for an ink metering device 30 in accordance with the present invention. Inking system 100 includes an ink supply 10, a structural member 20, and removable ink metering devices 30 connected to structural member 20 via clamps 31. Structural member 20 includes a distribution rail 50 and internal manifold 60. The shuttle 70 is located inside internal manifold 60.

[0011] An internal manifold 60 is incorporated into distribution rail 50 of main structural member 20 which eliminates components and complexity of the inking system. Ink manifold 60 can be formed by extrusion, machined, a machined bore or a cast cavity, for example, internal to rail 50. Internal manifold includes an upper manifold chamber 62 and a lower manifold chamber 64.

[0012] Each removable ink metering device 30 includes two motors 32, 34 two pumps 36, 38 and a single wedge mounting plate 39 as shown in Fig. 5. Ports 52 connect upper manifold chamber 62 to pump 36 and lower manifold chamber 64 to pump 38, respectively.

[0013] Ink supply 10, which may be the main ink supply of inking system 100, is connected to internal manifold 60. A control valve 11 may be provided. Ink is distributed from supply 10 to each of the ink metering devices 30 via internal manifold 60.

[0014] During operation, ink enters inking system 100 via ink supply 10 and fills manifolds 62, 64 across a length of rail 50 under pressure from ink supply 10. The ink supply pressure is maintained at a sufficient level for the ink to flow from the ink supply 10 to and through the inter manifold chambers 62, 64. The ink moves from manifolds 62, 64 through ports 52. Motors 32, 34 and pumps 36, 38 pump ink via channels 54 to orifices 56. Ink exits structural member 20 through orifices 56 into scallops 58 and is distributed to printing units therefrom.

[0015] As shown in Figs. 1 to 3, internal manifold 60 includes a shuttle 70 in accordance with the present invention. A shuttle 70 is added inside each internal manifold chamber 62, 64. The main ink supply 10 motivates shuttle 70 to move along a length of manifold 60 in direction A (Fig. 2) until shuttle 70 reaches a stop 72 at an end of internal manifold 60 opposite the main ink supply 10. For example, in Fig. 1, the ink supply is located on a gear side of a printing press unit and a stop 72 is located on the work side of the printing unit. A second stop 74 is provided on the gear side of the printing unit. Shuttle 70 resides at stop 72 until a color or ink change is desired.

[0016] A secondary ink supply 12 including an ink of a different color is shown in Figs. 3 and 4. Secondary ink supply 12 is connected to structural member 20 via a quick connect feed block 14. As shuttle 70 is motivated, shuttle 70 pushes the main ink supply ink back to the main ink supply 10 in a direction B. Figs. 3 and 4. A pressure tight interface between shuttle 70 and internal manifold 60 efficiently wipes the ink leaving only a minimal film of ink adhered to an interior of the manifold surface. The ink from the secondary ink 12 supply then flows through the manifold 60. The remaining ink film is largely undisturbed as the secondary ink passes through manifold 60 due to a viscous boundary layer. Therefore, the hue shift between ink colors is minimized to a less than noticeable level. The process can then be reversed with the main ink supply ink color

motivating shuttle 70 to push the secondary ink back to the secondary ink supply 12 in direction A. A third ink color can then be swapped with the main ink supply 10, if desired.

[0017] Providing an internal manifold 60 with a shuttle 70 therein reduces ink waste and the time required for changing color of a closed ink delivery system. The ink color changing process is easily made semi-automatic/automatic with minimal manual intervention.

[0018] The shuttle 70 advantageously provides the ability to cleanly and quickly remove ink from internal manifold 60 so the inks 10, 12 can be removed and or the ink supply may be changed.

[0019] As shown in Figs. 1 to 3, internal manifold 60 includes a shuttle 64 in accordance with the present invention. Shuttle 64 is added inside internal manifold 60. The main ink supply 10 motivates shuttle 64 to move axially along a length of manifold 60 in direction A until the shuttle reaches a stop 66 at an end of internal manifold 60 opposite the main ink supply 10. For example, in Fig. 1, the ink supply is located on the gear side 22 of a printing press unit and the stop is located on the work side 24 of the printing unit. Shuttle 64 resides at the stop location until a color or ink change is desired. Shuttle 64 is then motivated toward the main ink supply 10 by adding pressure to the back side of the shuttle 64. This can be attained by adding ink under pressure to the backside of shuttle 64.

[0020] In the preceding specification, the invention has been described with reference to specific exemplary embodiments and examples thereof. It will, however, be evident that various modifications and changes may be made thereto without departing from the broader spirit and scope of invention as set forth in the claims that follow. The specification and drawings are accordingly to be regarded in an illustrative manner rather than a restrictive sense.

WHAT IS CLAIMED IS:

1. An inking system for a printing press comprising:
 - a structural member;
 - an internal ink manifold housed in the structural member;
 - a shuttle inside the internal ink manifold and movable along a length of the internal ink manifold; and
 - a plurality of ink supply sources, a first ink supply source for connection to a first end of the internal ink manifold and a second ink supply source for connection to a second end of the internal ink manifold.
2. The inking system as recited in claim 1 wherein the shuttle has a pressure tight interface with an interior of the internal ink manifold and.
3. The inking system as recited in claim 1 wherein the shuttle is coaxial with the internal ink manifold.
4. The inking system as recited in claim 1 wherein a flow of ink from the first ink supply moves the shuttle toward the second end of the manifold
5. The inking system as recited in claim 1 wherein a flow of ink from the second ink supply moves the shuttle toward the first end of the manifold
6. The inking system as recited in claim 1 wherein the first ink supply source includes ink of a first color and the second ink supply source includes ink of a different color.
7. The inking system as recited in claim 1 further comprising a stop at the first end and second end of the internal ink manifold.
8. A printing press comprising:
 - at least one printing unit; and
 - an inking system according to claim 1 for providing ink to the at least one printing unit.

9. A method of changing ink color in an inking system comprising the steps of:
- providing an internal ink manifold with a shuttle housed therein;
 - supplying ink of a first color to the internal ink manifold via an ink supply on a first end of the internal ink manifold;
 - moving the shuttle, via pressure from the ink on a first side of the shuttle, along a length of the internal ink manifold until the shuttle reaches a stop or a second end of the internal ink manifold;
 - supplying ink of a second color to the internal ink manifold via a secondary ink supply on a second end of the internal ink manifold; and
 - moving the shuttle, via pressure from the second ink on a second side of the shuttle, along the length of the internal ink manifold until the shuttle reaches a stop or the first end of the internal ink manifold.

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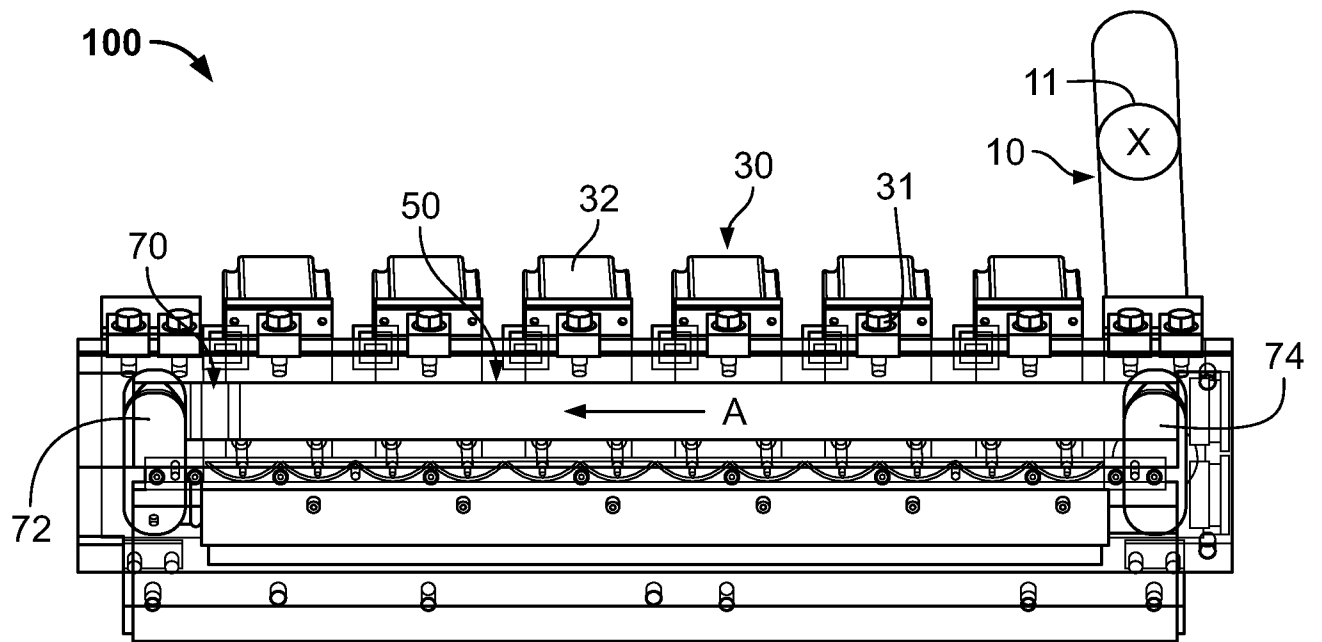


FIG. 1

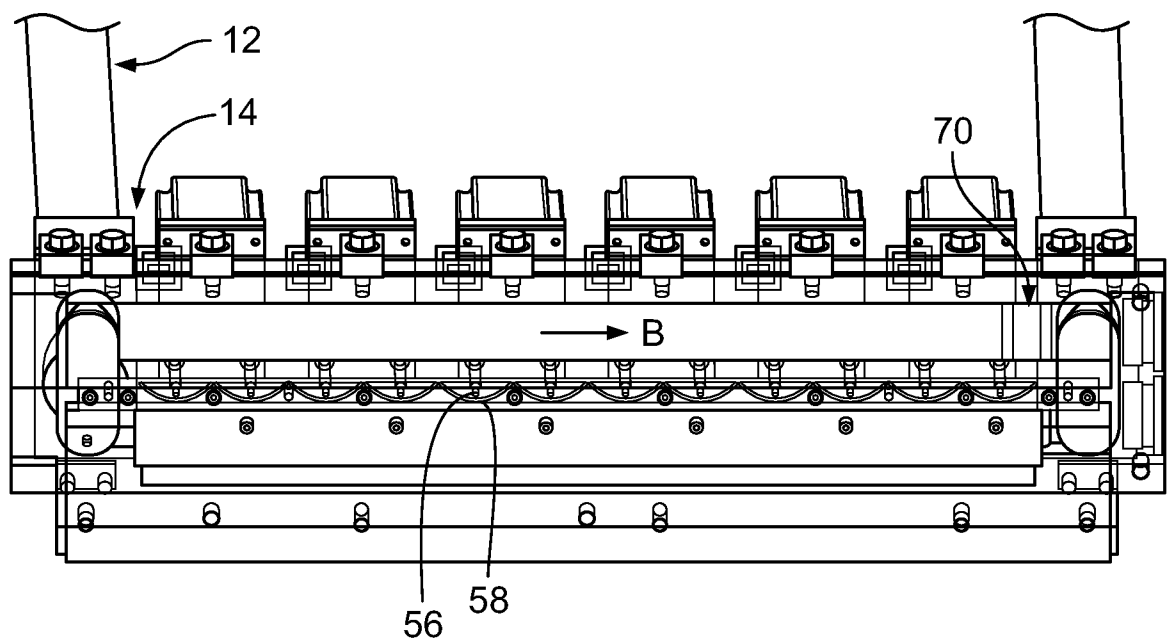


FIG. 2

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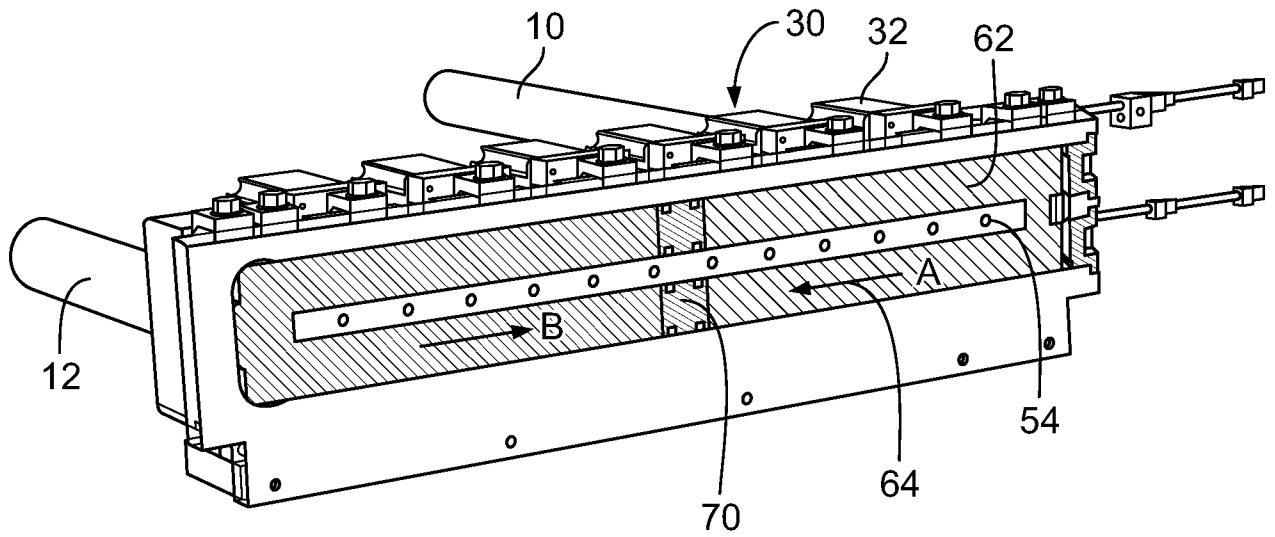


FIG. 3

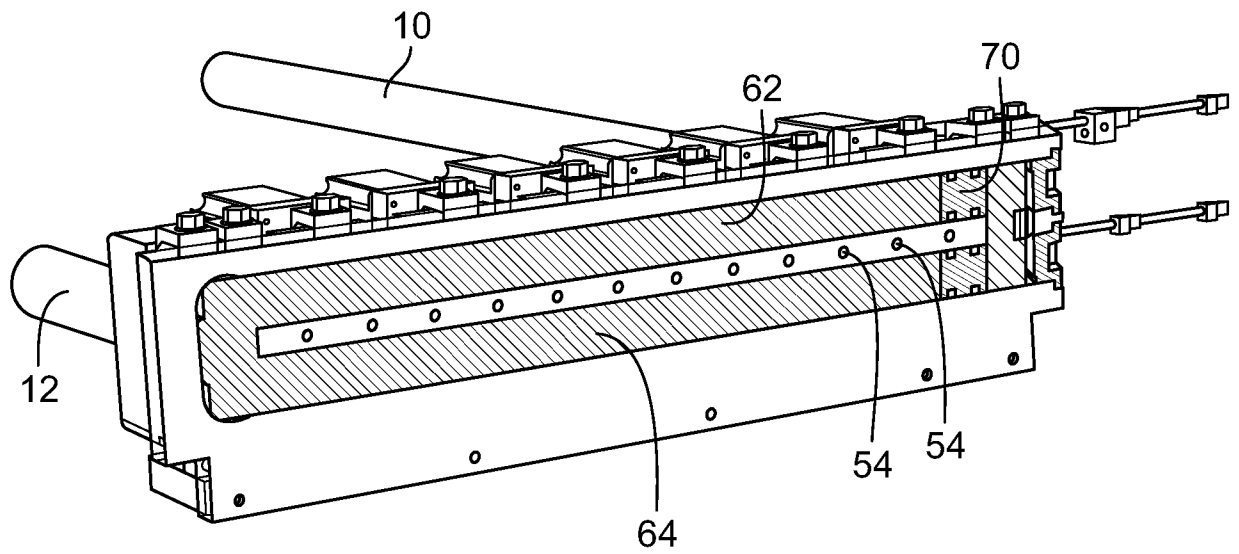


FIG. 4

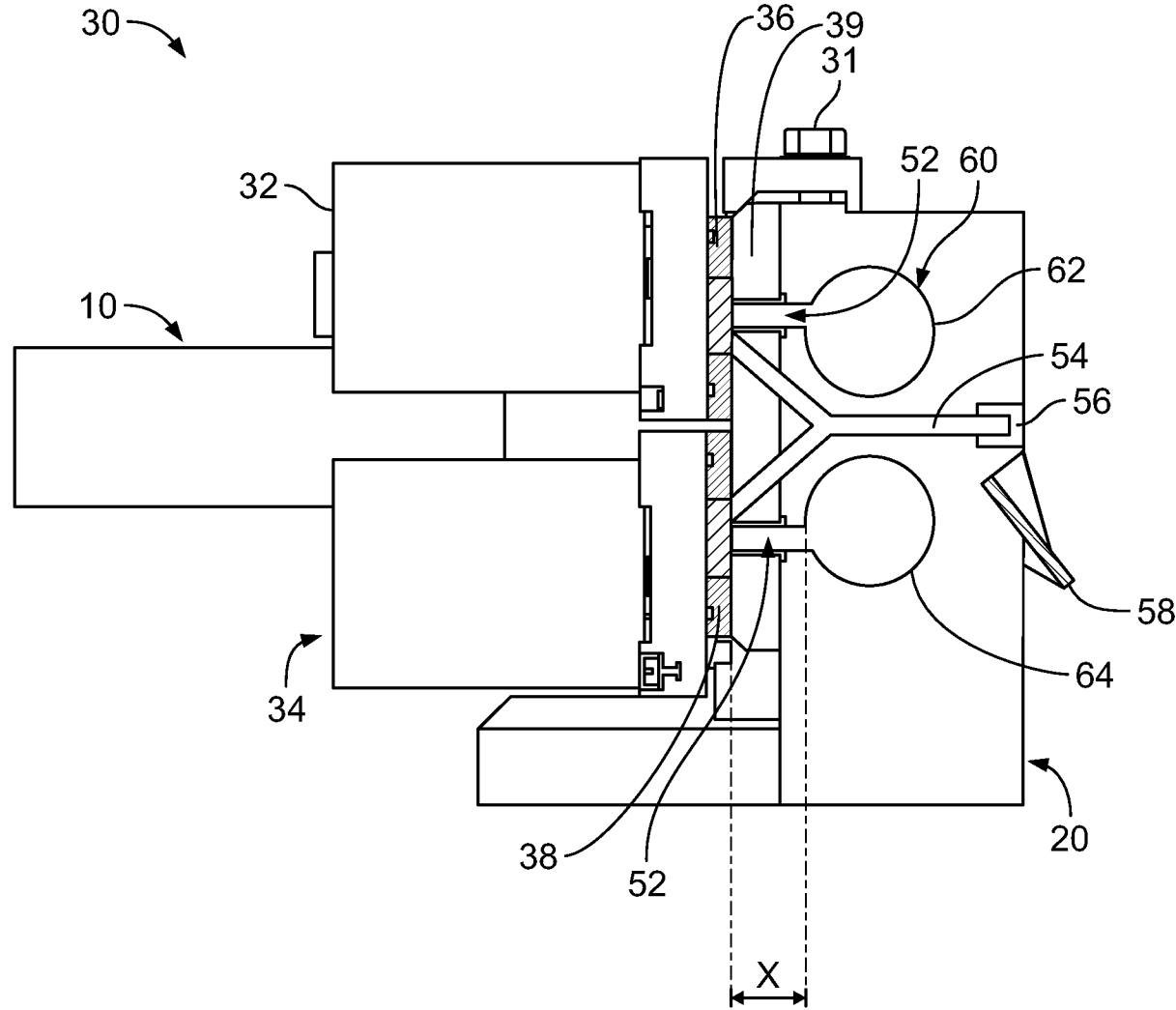


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2018/029799

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B41F 31/02; B41F 31/08; B41F 31/10; B41F 31/12; B41F 31/18 (2018.01)

CPC - B41F 31/027; B41F 31/00; B41F 31/02; B41F 31/08 (2018.05)

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)

See Search History document

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

USPC - 101/365; 101/366; 101/350.2; 101/350.1; 101/351.4 (keyword delimited)

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

See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2003/0230207 A1 (MOMOT) 18 December 2003 (18.12.2003) entire document	1-9
A	US 2011/0080456 A1 (SHIBATA et al) 07 April 2011 (07.04.2011) entire document	1-9
A	US 5,574,485 A (ANDERSON et al) 12 November 1996 (12.11.1996) entire document	1-9
A	US 2010/0201734 A1 (KUK) 12 August 2010 (12.08.2010) entire document	1-9
A	US 2014/0139587 A1 (XEROX CORPORATION) 22 May 2014 (22.05.2014) entire document	1-9

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

* Special categories of cited documents:

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Date of mailing of the international search report

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