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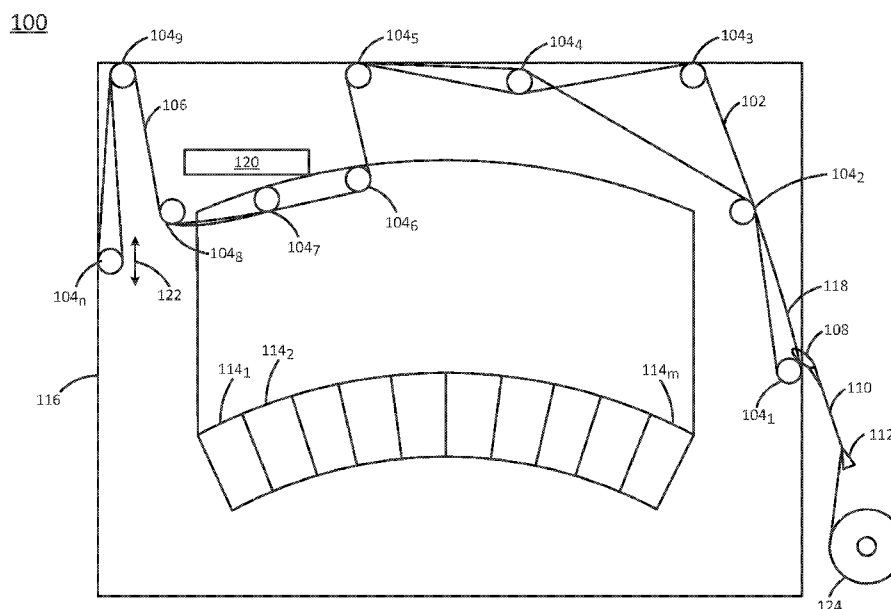


FIG. 1

(57) Abstract: In example implementations, an apparatus is provided. The apparatus includes a plurality of pulleys coupled to an interior portion of a printing device along a paper path. A first string is coupled to the plurality of pulleys. A continuous loop is formed by the first string around the plurality of pulleys with a link coupled to both ends of the first string. A second string is coupled to the link. An end of the second string includes a kite to receive an end of a print media.



TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

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- *as to the identity of the inventor (Rule 4.17(i))*
- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

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PULLEY THREAD ASSISTS FOR PRINTERS

BACKGROUND

[0001] Print devices can be used to print images or text onto print media. Print devices can come in a variety of different forms and use different types of printing agents (e.g., ink, toner, and the like). For example, some print devices may be multi-function devices that can provide different functions include fax, copy, print, and the like.

BRIEF DESCRIPTION OF THE DRAWINGS

[0002] FIG. 1 is a block diagram of a side view of an example printing device of the present disclosure;

[0003] FIG. 2 is a block diagram of pulley coupled to an end of an idler roller of the printing device of the present disclosure;

[0004] FIG. 3 is a block diagram of a starting pulley with a link to receive a kite and kite string of the present disclosure;

[0005] FIG. 4 is a block diagram of an ending pulley to control a tension in a pulley string of the present disclosure; and

[0006] FIG. 5 is a flow chart of an example method for feeding a print media through a paper path of a printing device of the present disclosure.

DETAILED DESCRIPTION

[0007] Examples described herein provide an apparatus and method for printing devices that assist in feeding a print media through a paper path of the printing device. In some print applications, large print media may be fed to a

printing device. The printing device may be relatively large to accommodate the size of the print media. As a result, the paper path can run towards a top of the printing device and be several feet high. In addition, the paper path may be difficult to access to manually feed the print media. For example, portions of the paper path may run behind components and be difficult to reach. Thus, an operator may have to climb up on ladders or stools to manually feed the print media through the paper path for these large printing devices. The operator may also have difficulty accessing each portion of the print path to feed the print media manually. This can be a cumbersome and inefficient process.

[0008] The present disclosure provides a two-piece pulley thread assist for these large printing devices to help initially feed the print media through the paper path. The pulley thread assist may include a pulley system mounted along the paper path of the printing device. A first continuous string may be coupled to the pulley system. The first continuous string may include an eyelet or a link where a second string may be attached.

[0009] The pulley system may be used to feed the second string through the paper path. A kite may be attached to an end of the second string. The print media may be attached to the kite and then the second string with the kite may be pulled through the paper path to feed the print media through the paper path. As a result, the print media may be fed through the paper path without an operator having to climb on top of the printing device to manually feed the print media through the paper path.

[0010] FIG. 1 illustrates an example printing device 100 of the present disclosure. In one example, the printing device 100 may include a pulley system 102 that may assist in feeding a print media 124 through a paper path. The print media 124 may be a continuous roll of paper that is fed through the printing device 100.

[0011] The printing device 100 may also include print bars 114_1 to 114_m (also referred to herein individually as a print bar 114 or collectively as print bars 114). The print bars 114 may include printheads (not shown) that dispense printing fluid onto the print media 124 based on a print job. The print bars 114 may be arranged in an arched pattern to assist in keeping the print media 124 flat

against rollers that transport the print media 124 through the print bars 114 for printing.

[0012] In one example, the printing device 100 may print on the print media 124 that is continuously fed through the printing device 100. The printing device 100 may have relatively large dimensions and be designed to feed the print media 124 from an infeed side 118 up and over the print bars 114. The print media 124 may be fed through the print bars 114 from the outfeed side 116. In some instances, the print media 124 may be then flipped and fed back through the print bars 114 from the infeed side 118 and out through the outfeed side 116 for side-by-side printing.

[0013] As a result, when a print job is completed and a different roll of the print media 124 is used, the print media 124 is fed through the paper path that travels over the print bars 114. With the large dimensions of the printing device 100, this may be difficult for a technician, as described above.

[0014] In one example, the pulley system 102 is to assist the technician in feeding the print media 124 through the top of the printing device over the print bars 114, or to any other print path that may be difficult to reach or access within the printing device 100. The pulley system 102 may include a plurality of pulleys 104₁ – 104_n (also referred to herein individually as a pulley 104 or collectively as pulleys 104). In one example, the pulleys 104 may be fabricated from a plastic or a metal.

[0015] In one example, the pulleys 104 may have a cylindrical shape. The pulleys 104 may have a similar size or dimensions or some of the pulleys 104 may have different sizes and dimensions. In one example, if the pulleys 104 are coupled to an end of an idler roller, the cross-sectional diameter of the pulley 104 may be approximately the same as the cross-sectional diameter of the idler roller.

[0016] The pulley system 102 may also include a string 106 (also referred to as a pulley string) that forms a continuous loop around the pulleys 104. The loop may be completed by a link 108 that couples together both ends of the string 106 around the pulleys 104.

[0017] A second string 110 may be coupled to the link 108. The second

string 110 may also be referred to as a kite string. The pulley system 102 may be used to move the second string 110 through the print path to the infeed side 118 of the printing device 100. For example, an end of the second string 110 may be coupled to the link 108 on the infeed side 118. The second string 110 may be moved through the paper path via the pulley system 102 such that a first end of the second string 110 is located at the outfeed side 116 and a second end of the second string 110 is located at the infeed side 118. The second string 110 may be removed from the link 108.

[0018] The second end of the second string 110 may be coupled to a kite 112. The print media 124 may be coupled to the kite 112 on an infeed side 118. The first end of the second string 110 on the outfeed side 116 may be pulled through the paper path to move the kite 112 with the print media 124 through the paper path of the printing device 100 until the print media 124 reaches the outfeed side 116. The second string 110 may be held, or biased, towards a center of the paper path along the idler rollers as the second string 110 is pulled. The print media 124 may then be removed from the kite 112 on the outfeed side 116 and fed through the print bars 114 to begin continuous printing on the print media 124.

[0019] The string 106 and the second string 110 may be any type of string or thread that may be heat resistant. For example, the string 106 and the second string 110 may be a poly-coated fiber or material.

[0020] In one example, the pulleys 104 may be coupled to idler rollers that are located along a top of the printing device 100. As a result, an existing printing device 100 may be retrofitted with the pulley system 102 of the present disclosure. Some pulleys 104 may be mounted without an idler roller. For example, some pulleys (e.g., pulleys 104₆, 104₇, and 104₈) may be mounted along a wall of the printing device 100 without an idler roller to avoid moving components 120 within the printing device 100.

[0021] Other pulleys (e.g., a last pulley 104_n) may be mounted to a movable fastener to allow the position of the pulley 104 to be adjusted to control an amount of tension on the string 106. For example, the movable fastener may move up and down as shown by an arrow 122 to remove any slack from the

string 106 as it travels around the pulleys 104.

[0022] It should be noted that although a certain number of pulleys 104 are illustrated in FIG. 1, any number of pulleys 104 may be deployed. In addition, although the pulleys 104 are illustrated as being in certain positions, the pulleys 104 may be located based on the design of the printing device 100.

[0023] It should be noted that the printing device 100 has been simplified for ease of explanation. The printing device 100 may include additional components that are not shown. For example, the printing device 100 may include drive motors, drive rollers, power supplies, other printing components, and the like.

[0024] FIG. 2 illustrates a top view of an example pulley 104 coupled to an end of an idler roller 202 of the printing device 100. As noted above, some pulleys 104 may be coupled to an end of an idler roller 202 of the printing device 100. This may allow the pulley system 102 to be retrofitted into existing printing devices 100.

[0025] The pulley 104 may be coupled to an end of the idler roller 202 and against an inner side of a wall 212, or surface, of the printing device 100. Said another way, the pulley 104 may be coupled between an end of the idler roller 202 and an inner side of the wall 212. The pulley 104 may be movably coupled such that the pulley 104 rotates with the idler roller 202, or rotates independently of the idler roller 202.

[0026] In one example, the pulley 104 may include a groove that forms a feed side 204 and a groove that forms a return side 206. The feed side 204 and the return side 206 may rotate in opposite directions. For example, as the string 106 moves along the groove in a feed direction 208, the feed side 204 of the pulley 104 may rotate in a similar direction. As the string 106 moves along a groove in a return direction 210, the return side 206 may also rotate in a similar direction.

[0027] FIG. 3 illustrates a block diagram of a starting pulley 104₁ with the link 108. In one example, the starting pulley 104₁ may be the first pulley located at the infeed side 118 of the printing device 100. As noted above, some pulleys 104 may not be coupled to an idler roller. FIG. 3 illustrates how the starting

pulley 104₁ is coupled to a wall. In addition, the starting pulley 104₁ may not have a separate feed side 204 and a return side 206 as illustrated in FIG. 2.

[0028] In one example, the loop of the string 106 may be formed by connecting both ends of the string 106 to the link 108. The link 108 may be a removable connector, such as a carabiner with a spring clasp or screw tight clasp. The link 108 may be sized and shaped to also move around the pulleys 104 in the pulley system 102. In other words, the link 108 should not be sized or shaped as to get stuck on a pulley 104 while the string 106 is pulled around the pulley system 102.

[0029] In one example, the second string 110 may be coupled to the link 108, as described above. The second string 110 may have an end coupled to the link 108 and pulled through the paper path at the top of the printing device 100. The end may be removed from the link 108 at the infeed side 118 and coupled to the kite 112. The kite 112 is shown in dashed lines in FIG. 3 as it is covered by the print media 124.

[0030] In one example, the kite 112 may be any shaped component that can secure an end of the print media 124. Although the kite 112 is illustrated as being a triangular shape, it should be noted that other shapes can be used (e.g., a square, a diamond, a rectangle, and the like). The kite 112 may be a firm material that is fabricated from plastic, cardboard, and the like. An end of the print media 124 may be folded over the kite 112, or coupled via any other means to the kite 112, to secure the end of the print media 124.

[0031] Once the print media 124 is secured to the kite 112, the end of the second string 110 on the outfeed side 116 may be pulled. In one example, the second string 110 may be biased towards a center of the idler rollers 202 to center the print media 124 through the paper path.

[0032] When the kite 112 reaches the outfeed side 116, the print media 124 may be removed from the kite 112. The print media 124 may be fed through the print bars 114 and the printing process may be initiated.

[0033] FIG. 4 illustrates an example of an ending pulley 104_n to control an amount of tension in the string 106 of the present disclosure. As noted above in FIG. 1, the last pulley 104_n may be coupled via a movable fastener 402. The

movable fastener 402 may allow the pulley 104_n to move up and down as shown by the arrow 122 to adjust an amount of tension in the string 106. For example, if the string 106 is too loose, the last pulley 104_n may be moved down to increase the amount of tension. If the string 106 is too tight, the last pulley 104_n may be moved up to decrease the amount of tension. The amount of tension may be set such that the string 106 travels over the pulleys 104 without slipping against the surface of the pulleys 104.

[0034] In one example, the movable fastener 402 may be a “C” clamp that may be coupled against an edge of a wall of the printing device 100. For example, the clamp may be loosened to allow the movable fastener 402 to be moved. The clamp may then be tightened to fix the position of the movable fastener 402.

[0035] In one example, the movable fastener 402 may be a spring tensioned mount. For example, the mount may be on a vertical spring that automatically adjusts the amount of tension in the string 106. For example, the spring may be set to a desired tension and the spring may move up and down based on changes to the amount of tension in the string 106.

[0036] In one example, the movable fastener 402 may be mounted on a bracket with slotted openings. The slotted openings may be vertically stacked. The pulley 104_n may be moved between the various different slotted openings up or down to control an amount of tension in the string 106.

[0037] It should be noted that a few examples of the movable fastener 402 are described above. However, it should be noted that any movable fastener 402 may be used that changes a distance that the string 106 travels to control an amount of tension in the string 106. Although the examples illustrate the movable fastener 402 moving up and down in a vertical direction to control the amount of tension in the string 106, the movable fastener 402 may also be designed to move horizontally, diagonally, or rotationally.

[0038] Thus, the pulley system 102 in the printing device 100 provides a thread assist to feed print media 124 through a paper path. A single technician may feed the print media 124 through the print path using the pulley system 102. The technician may avoid the use of ladders or other equipment that may

be dangerous or avoid having the technician reach inside of the printing device, which may be dangerous.

[0039] FIG. 5 illustrates a flow diagram of an example method 500 for feeding a print media through a paper path of a printing device. In an example, the method 500 may be performed using the pulley system of the printing device 100 that illustrated and described above.

[0040] At block 502, the method 500 begins. At block 504, the method 500 attaches a kite string to a first string coupled to a pulley system located along a paper path of a printing device. In one example, an end of the kite string may be coupled to a link in the first string at an outfeed side.

[0041] At block 506, the method 500 feeds the kite string through the paper path via movement of the pulley system such that a first end of the kite string is located at an outfeed side of the printing device and a second end of the kite string is located at an infeed side. For example, the first string may be rotated or pulled around the pulley system to work the kite string through the paper path until the second end of the kite string appears at the infeed side.

[0042] At block 508, the method 500 detaches the kite string from the first string. For example, the kite string may be removed from the link in the first string. In one example, a kite may be coupled to the second send of the kite string at the infeed side.

[0043] At block 510, the method 500 attaches an end of a print media to a kite located on the second end of the kite string. In one example, the print media may be coupled to the kite via any securing means. For example, the print media may be folded over the kite, may be attached via an adhesive, and the like. The kite may be any shape fabricated from a plastic, a cardboard, or any other firm material.

[0044] In one example, the print media may be paper. The print media may be provided on a roll that is continuously fed through the printing device. In other words, the printing device may be used to print on a long continuous sheet of print media rather than cut sheets of a particular dimension.

[0045] At block 512, the method 500 pulls the kite string through the paper path to feed the print media through the paper path from the infeed side to the

outfeed side. For example, the first end of the kite string at the outfeed side maybe pulled to pull the print media through the paper path. The kite string may be biased or held towards a center of the paper path to position the print media towards a center of the paper path.

[0046] When the kite appears at the outfeed side, the print media may be removed from the kite. The kite and the kite string may also be removed from the paper path. The print media may be fed through a print path of print bars of the printing device and the printing process may be initiated.

[0047] The method 500 may be repeated for each roll of print media that is fed through the printing device. For example, after printing on a roll of print media is completed, the method 500 may be executed to feed a subsequent roll of print media through the printing device. At block 514, the method 500 ends.

[0048] It will be appreciated that variants of the above-disclosed and other features and functions, or alternatives thereof, may be combined into many other different systems or applications. Various presently unforeseen or unanticipated alternatives, modifications, variations, or improvements therein may be subsequently made by those skilled in the art which are also intended to be encompassed by the following claims.

CLAIMS

1. An apparatus, comprising:
 - a plurality of pulleys coupled to an interior portion of a printing device along a paper path;
 - a first string coupled to the plurality of pulleys;
 - a link coupled to both ends of the first string to form a continuous loop around the plurality of pulleys; and
 - a second string coupled to the link, wherein an end of the second string comprises a kite to receive an end of a print media.
2. The apparatus of claim 1, wherein, a subset of the plurality of pulleys are coupled to respective ends of idler rollers located along the paper path.
3. The apparatus of claim 1, wherein the plurality of pulleys comprise a first groove for a feed direction and a second groove for a return direction.
4. The apparatus of claim 1, wherein a last pulley is coupled to an outfeed side of the printing device via a movable fastener to control an amount of tension in the first string.
5. The apparatus of claim 4, wherein the movable fastener comprises a C-clamp mechanical fastener.
6. The apparatus of claim 1, wherein the print media comprises a continuous web of print media.
7. The apparatus of claim 1, wherein the paper path is located along a top of the printing device.
8. A printing device, comprising:
 - a plurality of idler rollers along a paper path, wherein at least one of the

plurality of idler rollers comprises a pulley coupled to an end of a respective idler roller;

 a first string coupled to the pulley;

 a link coupled to both ends of the first string to form a continuous loop around the plurality of pulleys; and

 a second string coupled to the link, wherein an end of the second string comprises a kite to receive an end of a print media.

9. The printing device of claim 8, wherein the first string is coupled to a feed side and a return side of the pulley.

10. The printing device of claim 8, wherein the first string is to pull the second string through the paper path such that a first end is located on an outfeed side of the printing device and the kite is located on an infeed side of the printing device.

11. The printing device of claim 8, further comprising:

 an adjustable pulley at an outfeed side of the printing device to control an amount of tension in the first string.

12. A method, comprising:

 attaching a kite string to a first string coupled to a pulley system located along a paper path of a printing device;

 feeding the kite string through the paper path via movement of the pulley system such that a first end of the kite string is located at an outfeed side of the printing device and a second end of the kite string is located at an infeed side;

 detaching the kite string from the first string;

 attaching an end of a print media to a kite located on the second end of the kite string; and

 pulling the kite string through the paper path to feed the print media through the paper path from the infeed side to the outfeed side.

13. The method of claim 12, wherein the print media comprises a continuous web of print media.

14. The method of claim 12, wherein the pulling the kite string comprises biasing the kite string towards a center of the paper path.

15. The method of claim 12, wherein the attaching the kite string comprises coupling the first end of the kite string to a link in the first string.

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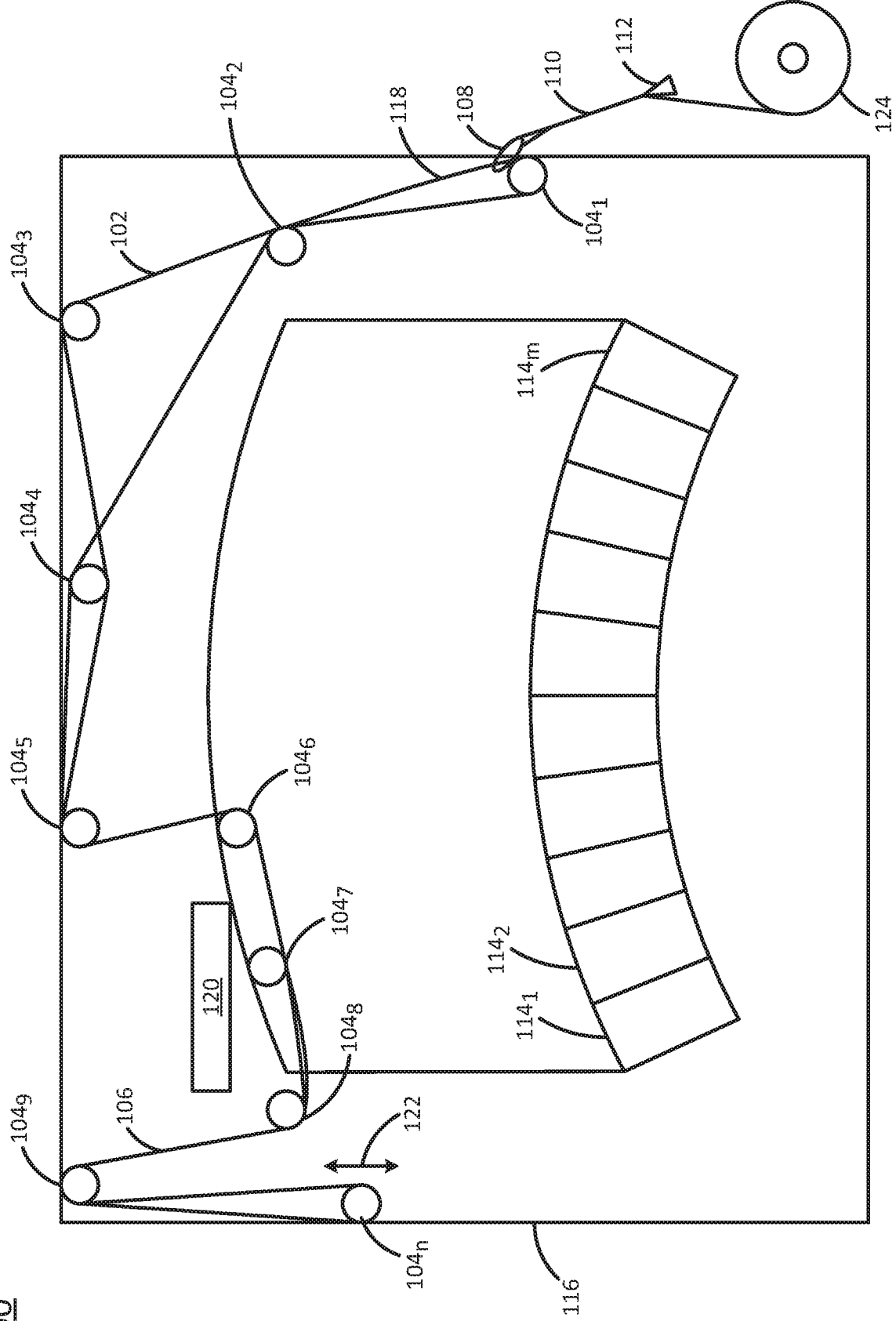


FIG. 1

100

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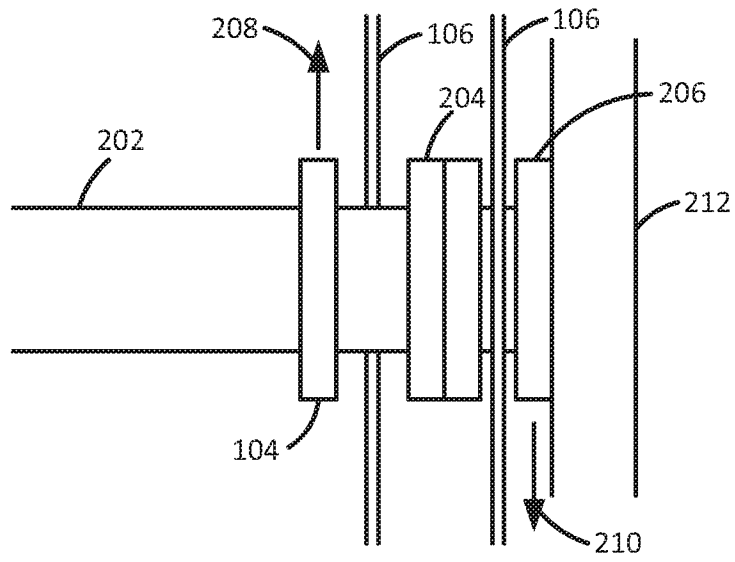


FIG. 2

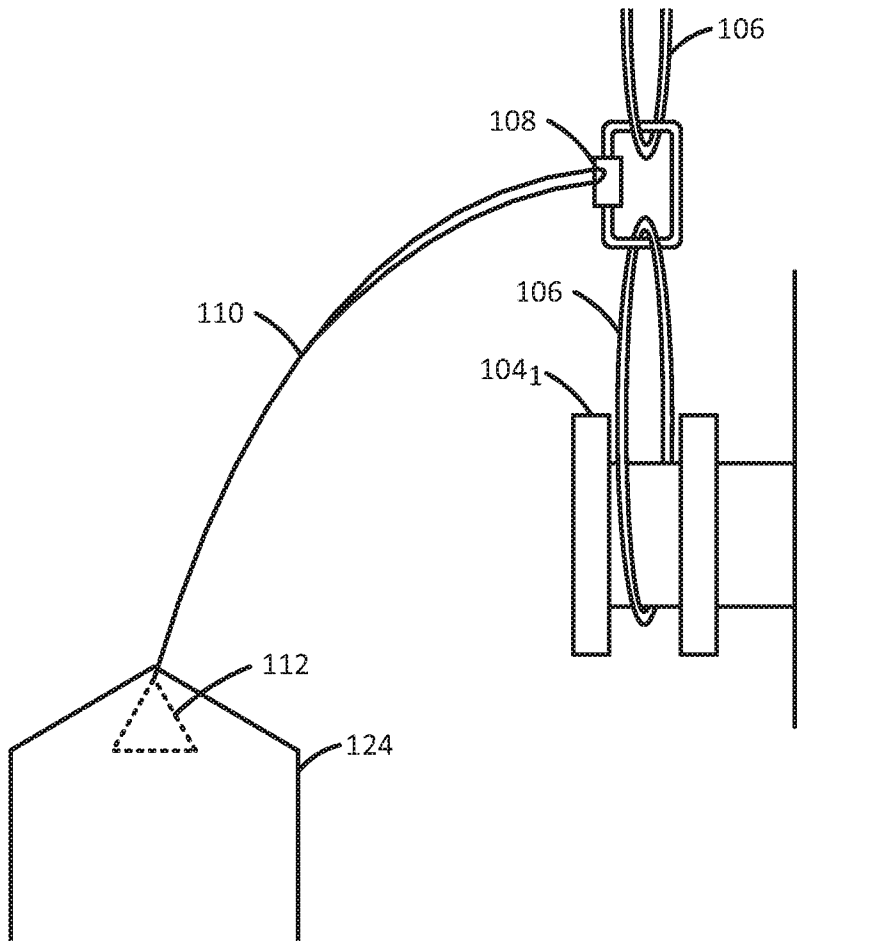


FIG. 3

100

3/4

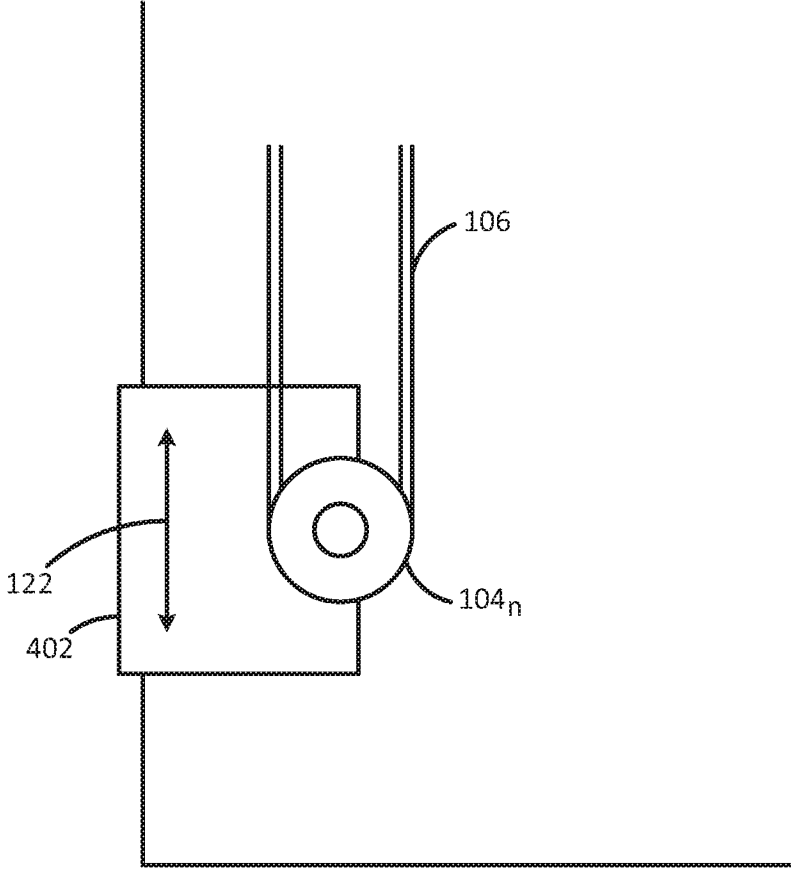


FIG. 4

500

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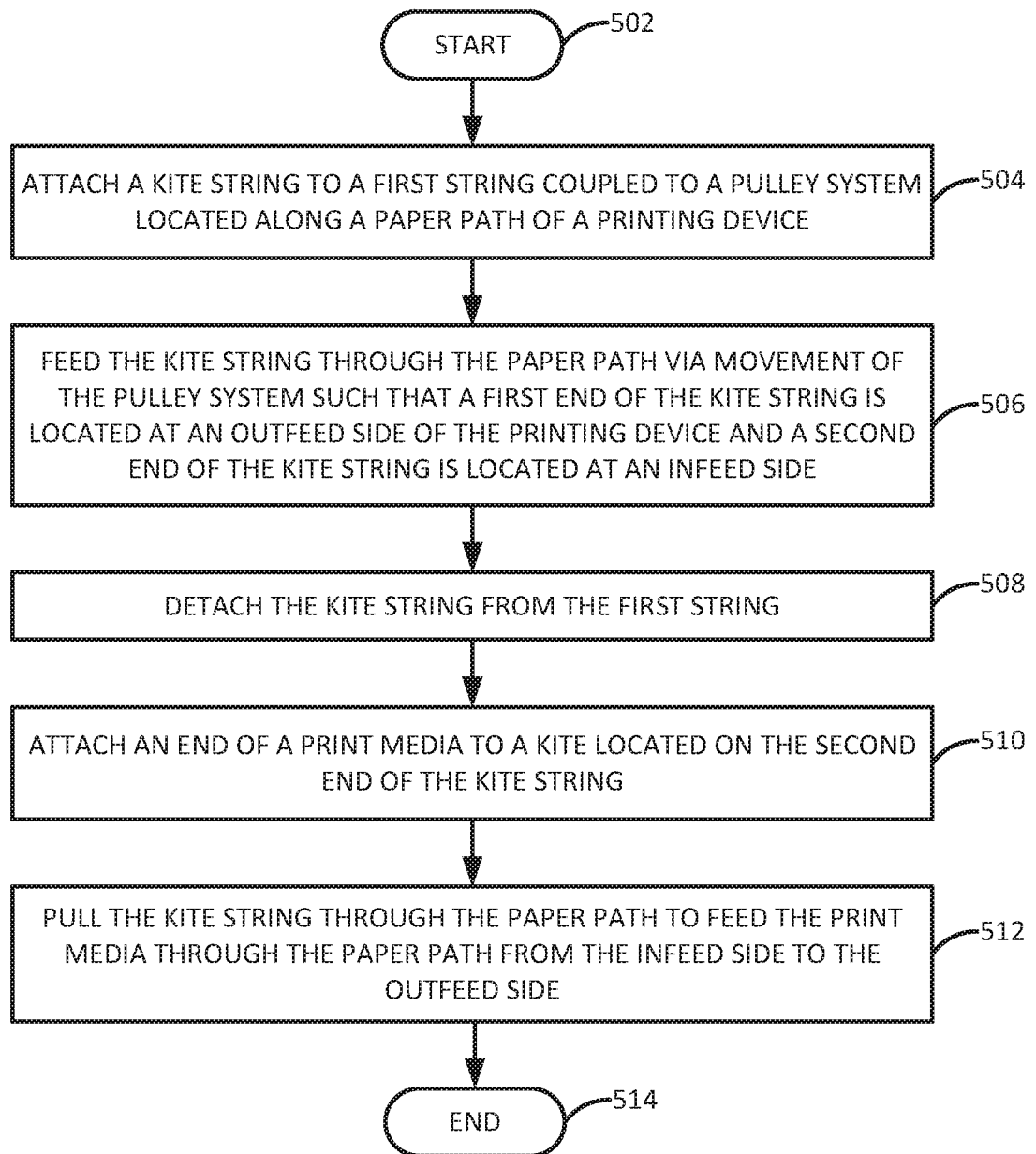


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 2019/016627

A. CLASSIFICATION OF SUBJECT MATTER		
B41J 13/08 (2006.01) B65H 5/02 (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)		
B41J 11/00-11/66, 13/08, B65H 5/02		
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)		
PatSearch (RUPTO Internal), USPTO, PAJ, Espacenet, Information Retrieval System of FIPS		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 7540236 B2 (HINTERKOPF GMBH) 02.06.2009, col.5 line 18 - col.6 line 63, fig.1	1-15
A	JP S5541204 A (RICON KK) 24.03.1980	1-15
A	US 5123583 A (BROTHER KOGYO KABUSHIKI KAISHA) 23.06.1992	1-15
A	US 6711376 B2 (KONICA CORPORATION) 23.03.2004	1-15
☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
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10 September 2019 (10.09.2019)	26 September 2019 (26.09.2019)	
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