METHODS AND DEVICES FOR CONTROLLING A LEADING EDGE OF A MEDIA SHEET IN AN IMAGE FORMING DEVICE

Inventors: Niko Jay Murrell, Lexington, KY (US); Thom Jer Magdadaro Bacalso, Cebu City (PH); Edward Lynn Trippett, Lexington, KY (US); Jason Lee Rowe, Richmond, KY (US); Brian Allen Blair, Richmond, KY (US)

Correspondence Address:
John J. McArdle, Jr.
Lexmark International, Inc.
Intellectual Property Department
740 West New Circle Road
Lexington, KY 40550 (US)

Assignee: Lexmark International, Inc.

The present application is directed to devices and methods for moving media sheets within an image forming device. In one embodiment, the device includes a support floor to support the media sheet. Wear members may be positioned across a width of the support floor and include a height to extend outward from the floor. Further, support members may be positioned across the floor and have a height to also extend outward from the floor. The wear members and the support members support the media sheet as it moves along the media path. The heights of the wear members and the support members are such to prevent the media sheet from buckling being a certain amount and preventing media jams.
METHODS AND DEVICES FOR CONTROLLING A LEADING EDGE OF A MEDIA SHEET IN AN IMAGE FORMING DEVICE

BACKGROUND

[0001] The present application is directed to devices and methods for moving a media sheet in an image forming device and, more specifically, to methods and devices to control a leading edge of the media sheet while entering into or moving along a media path.

[0002] An input area of an image forming device includes an input tray for holding one or more media sheets and a pick mechanism for moving the sheets through a section of the media path of the image forming device. The input area is designed to support a large variety of media sheets including paper, envelopes, cardstock, labels, signage, and the like. The mechanical properties of such an assortment of media sheets are noticeably distinct. Fiber content and alignment, material type, thickness, orientation, roughness, and other factors influence the ability of the pick mechanism to move the media sheets from the input tray.

[0003] One drawback of some previous image forming devices is the pick mechanism causes buckling of the media sheet while it moves within the input area. The buckled sheet may catch on a corner of the input tray or a support rib and fold under as the sheet is moved along the media path. The buckled sheet is also much more likely to find catch points further along the media path. The buckled media sheet may further require significantly higher motor torque on the pick mechanism to move the sheets from the input tray and along the media path.

SUMMARY

[0004] The present application is directed to devices and methods to move media sheets within an image forming device. In one embodiment, the device includes a support floor to support the media sheet. Wear members may be positioned across a width of the support floor and include a height to extend outward from the floor. Further, support members may be positioned across the floor and have a height to also extend outward from the floor. The wear members and the support members support the media sheet as it moves along the media path. The heights of the wear members and the support members are such to prevent the media sheet from buckling being a certain amount and preventing media jams.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIG. 1 is a side schematic view illustrating an image forming device according to one embodiment.

[0006] FIG. 2 is a partial perspective view illustrating an input feeder according to one embodiment.

[0007] FIG. 3 is a cross section view illustrating a media path according to one embodiment.

[0008] FIG. 4 is a top view illustrating an input feeder according to one embodiment.

[0009] FIG. 5 is a cross section view illustrating a media path according to one embodiment.

DETAILED DESCRIPTION

[0010] The present application is directed to devices and methods for moving a media sheet within an image forming device. The media path includes one or more supports spaced across the width of the path to reduce and/or eliminate buckles within the media sheet. In one embodiment, the device includes a combination of support members and wear members that are spaced across the width of the media path to support the media sheet.

[0011] FIG. 1 depicts a representative image forming device, indicated generally by the numeral 10. The image forming device 10 includes a media tray 13 sized to hold a first stack of media sheets 16. A sheet pick mechanism 18 moves the media sheets from the tray 14 and along a ramp 15 that directs the sheets further along the media path. In one embodiment, sheet pick mechanism 18 includes a roller 11 positioned on a pivoting arm 12. The pivoting arm 12 causes the roller 11 to remain in contact with a top-most sheet on the media stack 16. Rotation of the roller 11 moves the media sheet from the stack 16 with the leading edge contacting the ramp 15 and being moved along the media path.

[0012] A multipurpose feeder 20 may be included to move additional media sheets along the media path. The feeder 20 includes a support floor 7 adjacent to a ramp 15. A pick mechanism 19 may include a pivoting arm 8 and a roller 9. Rotation of the roller 9 moves the media sheet along the media path from the support floor 7 and up the ramp 15. The pick mechanism 19 within the multipurpose feeder 20 may be the same or different from the pick mechanism 18 associated with the media tray 13.

[0013] The operation of the image forming device 10 is conventionally known. After the media sheet is introduced through input tray 14 or the multipurpose feeder 20, the media sheet is presented at a media alignment mechanism 22. The media alignment mechanism 22 may include a nip formed between a pair of rollers 102, 104. The media alignment mechanism 22 may remove lateral skew from the media sheet and precisely time its passage on to the image forming stations downstream.

[0014] After the media sheet passes the media alignment mechanism 22 it contacts a transport belt 24, which carries the media sheet successively past photoconductor units 26. At each photoconductor unit 26, a latent image is formed by an imaging device 30 and optically projected onto a photoconductive member. The latent image is developed by applying toner to the photoconductive member from a toner reservoir. The toner is subsequently deposited on the media sheet as it is conveyed past the photoconductor unit 26 by the transport belt 24.

[0015] The toner is then thermally fused to the media sheet by the fuser 32 and the sheet then passes through reversible exit rollers 34, to land facedown in the output stack 35 formed on the exterior of the image forming apparatus body. Alternatively, the exit rollers 34 may reverse motion after the trailing edge of the media sheet has passed the entrance to the duplex path 36, directing the media sheet through the duplex path 36 for the printing of another image on the back side thereof.

[0016] FIG. 2 illustrates one embodiment of the multipurpose feeder 20. In this embodiment, the door 14 is in an open orientation as compared to FIG. 1 illustrating the door 14 in
the closed orientation. In the open orientation, the inner surface of the door 14 forms a portion of the support floor 7. The pick mechanism 19 comprising an arm 8 and roller 9 is pivotally positioned on a shaft 6. The pick mechanism 19 of the embodiment in FIG. 2 illustrates a single arm 8, however, multiple arms 8 each having one or more rollers 9 may be used for moving the media sheets. The ramp 15 is positioned at an end of the support floor 7 and acts to move the leading edge of the media sheet further along the media path and specifically towards the alignment mechanism 22. Ramp 15 may be positioned at a variety of angles relative to the support floor 7.

[0017] In one embodiment, the ramp 15 is constructed of acrylonitrile butadiene styrene that may be susceptible to erosion caused by continuous contact with the leading edge of the media sheets. The erosion may cause the surface of the ramp 15 to become pitted or roughened which may catch the leading edges resulting in jams. The erosion may also slow the movement of the media sheets resulting in timing issues that cause print defects.

[0018] To prevent erosion of the ramp 15, one or more wear members 40 are positioned across a width of the ramp 15. The wear members 40 extend outward from the ramp 15 and are constructed of a wear-resistant material that prevents the ramp 15 from being damaged as the leading edge of the media sheets move along the media path. The wear members 40 have a higher wear resistance than the ramp 15. In some embodiments, the wear members 40 may be constructed from acetal, Teflon, Teflon-impregnated nylon, Teflon-coated steel, and stainless steel. In one embodiment as illustrated in FIG. 3, the wear members 40 are completely constructed of the wear-resistant material. In another embodiment as illustrated in FIG. 5, an outer layer is constructed of the wear-resistant material and the remainder of the wear member 40 is constructed of another material. In another embodiment (not illustrated), only the top contact surface 41 of the wear member 40 is constructed of the wear resistant material. In one embodiment (not illustrated), the interior of the wear member 40 is constructed of the same material as the support floor 7 and ramp 15.

[0019] As illustrated in FIG. 3, each wear member 40 has a height H extending outward from the surface of the ramp 15. In one embodiment, each wear member 40 has the same height H. Wear members 40 may further include a width W. The width W of each wear member 40 may be the same, or may vary. A contact surface 41 may be formed on each of the wear members 40 to support the media sheet. In one embodiment as illustrated in FIG. 3, each contact surface 41 is substantially flat. In one embodiment, the wear members 40 are evenly spaced along the width of the ramp 15. In other embodiments, the wear members 40 are spaced at various intervals along the width.

[0020] The difference in heights between the wear members 40 and the surface of the ramp 15 may cause buckling across the width of the media sheets. Therefore, one or more support members 50 are positioned on the ramp 15. The support members 50 support the media sheets and prevent excessive buckling along the width of the sheet. As illustrated in the embodiment of FIG. 3, support members 50 have a height h that is less than or equal to the wear members 40. The support members 50 may have the same or different heights h. The support members 50 may have a variety shapes and sizes. In one embodiment as illustrated in FIG. 3, the support members 50 have a rounded contact surface. The rounded surface may prevent the media sheets from being snagged as they pass along the media path. In another embodiment, as illustrated in FIG. 5, support members 50 include a flattened contact surface to support a wider area of the media sheets. In one embodiment, each of the support members 50 has the same shape and size. In another embodiment, support members 50 have different shapes and sizes.

[0021] In one embodiment, support members 50 are integrally formed with the ramp 15 such as the embodiment illustrated in FIG. 5. In other embodiments, support members 50 are separate elements that are attached to the ramp 15.

[0022] In one embodiment as illustrated in FIG. 3, corner members 60 are positioned along the lateral edges of the media path. The corner members 60 extend outward from the ramp 15 and prevent the sheet from digging into the support floor 7 and ramp 15. In one embodiment, corner members 60 include an alignment edge 61 that aligns the media sheets. The alignment edge 61 may be curved as illustrated in FIG. 3, or angled relative to the ramp 15 to laterally align the media sheets. The corner members 60 may be constructed of a wear resistant material. In one embodiment, the corner members 60 are constructed of the same wear resistant material as the wear members 40.

[0023] FIG. 4 illustrates a top view of one embodiment of the multipurpose feeder 20. In this embodiment, the wear members 40 are aligned with the media path. In this embodiment, each of the rollers 9 for the pick mechanism 19 is positioned directly upstream from a wear member 40. This positioning assists in moving the media sheets accurately upward along the ramp 15.

[0024] In one embodiment as discussed above, the wear members 40 and support members 50 are positioned on a ramp 15. The ramp 15 may be part of an input feeder, such as the multipurpose feeder 20 or the media tray 13. Ramps may also be positioned at other locations along the media path. In another embodiment, the wear members 40 and support members 50 are positioned along a non-ramped location. Examples of non-ramped locations may include along curves within the duplex path 36, or along a section upstream from the fuser 32.

[0025] Spatially relative terms such as “under”, “below”, “lower”, “upper”, “upstream”, “downstream”, and the like, are used for ease of description to explain the positioning of one element relative to a second element. These terms are intended to encompass different orientations of the device in addition to different orientations than those depicted in the figures. Further, terms such as “first”, “second”, and the like, are also used to describe various elements, regions, sections, etc and are also not intended to be limiting. Like terms refer to like elements throughout the description.

[0026] As used herein, the terms “having”, “containing”, “including”, “comprising” and the like are open ended terms that indicate the presence of stated elements or features, but do not preclude additional elements or features. The articles “a”, “an” and “the” are intended to include the plural as well as the singular, unless the context clearly indicates otherwise.
The present invention may be carried out in other specific ways than those herein set forth without departing from the scope and essential characteristics of the invention. In one embodiment, the wear members 40 and the support members 50 have elongated shapes and are aligned substantially parallel along the media path. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

What is claimed is:

1. A media path to move a media sheet within an image forming device comprising:
   a support floor to support the media sheet;
   a plurality of wear members spaced across a width of the support floor, each of the wear members having a height to extend outward from the support floor; and
   a plurality of support members extending outward from the support floor and spaced between the plurality of wear members, the plurality of support members having a second height that is less than or equal to the height of the wear members;
   the support floor and the plurality of support members including a unitary construction;
   a contact surface of each of the plurality of wear members constructed of a material comprising a greater wear resistance than the support floor.

2. The media path of claim 1, further comprising a feeding mechanism to move the media sheet across the plurality of wear members and the plurality of support members.

3. The media path of claim 2, wherein the feeding mechanism comprises a pick arm pivotally mounted relative to the support floor and a roller that contacts the media sheet positioned on the support floor.

4. The media path of claim 3, wherein the roller is substantially aligned with one of the plurality of support members.

5. The media path of claim 1, wherein each of the plurality of wear members comprises a body having a unitary construction with the support floor and the plurality of support members.

6. The media path of claim 1, wherein each of the plurality of wear members and the plurality of support members include an elongated shape that are aligned substantially parallel.

7. The media path of claim 1, further comprising edge members positioned on each lateral edge of the media path, the edge members comprising an edge surface with an edge resistance that is substantially equal to the plurality of wear members.

8. The media path of claim 1, wherein each of the plurality of wear members comprising a substantially flat contact surface that contacts the media sheet.

9. The media path of claim 1, wherein the support members and the wear members are positioned at a curved section of the media path.

10. A media path to move a media sheet within an image forming device comprising:
    a support floor to support the media sheet;
    a ramp positioned adjacent to the support floor;
    a plurality of wear members positioned across a width of the ramp and comprising a height to extend outward from the ramp; and
    a plurality of support members positioned across the width of the ramp and comprising a second height to extend outward from the ramp, the second height being less than or equal to the height of the wear members;
    the plurality of wear members and the plurality of support members comprising different wear characteristics.

11. The media path of claim 10, wherein the plurality of support members and the plurality of wear members are interspersed across the width of the ramp.

12. The media path of claim 11, further comprising a pair of end members positioned at lateral edges of the ramp, the height of the wear members being the same as the end members.

13. The media path of claim 10, wherein the support floor and the plurality of support members comprise a unitary construction.

14. The media path of claim 10, wherein each of the plurality of wear members has a substantially flat contact surface to contact the media sheet.

15. The media path of claim 14, wherein each of the plurality of support members has a curved contact surface.

16. The media path of claim 10, further comprising a feeding mechanism positioned adjacent to the support floor to move the media sheet from the support floor and along the ramp.

17. A media path to move a media sheet within an image forming device comprising:
    an angled surface to support the media sheet;
    a plurality of wear members positioned across the angled surface and comprising a height to extend outward from the angled surface; and
    a plurality of support members positioned across the angled surface and comprising a second height to extend outward from the angled surface, the second height being less than or equal to the height of the wear members;
    the plurality of wear members and the plurality of support members comprising different wear characteristics.

18. The media path of claim 17, wherein the angled surface and the plurality of support members comprise a unitary construction.

19. The media path of claim 17, wherein each of the plurality of wear members includes a substantially flat contact surface to contact the media sheet.

20. The media path of claim 17, wherein the plurality of support members and the plurality of wear members include different shaped contact surfaces.

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