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**Sanders et al.**

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(54) **FEEDER TRAY ADJUSTABLE LEVELING ASSEMBLY FOR SPECIALTY MEDIA**

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***B65H 1/26*** (2006.01)
***B41J 13/10*** (2006.01)
***B65H 1/04*** (2006.01)

(52) **U.S. Cl.**
CPC .............. ***B41J 13/103*** (2013.01); ***B65H 1/04*** (2013.01); ***B65H 1/266*** (2013.01); *B65H 2701/122* (2013.01)

(58) **Field of Classification Search**
CPC .......................... B65H 2301/3311; B65H 3/66
See application file for complete search history.

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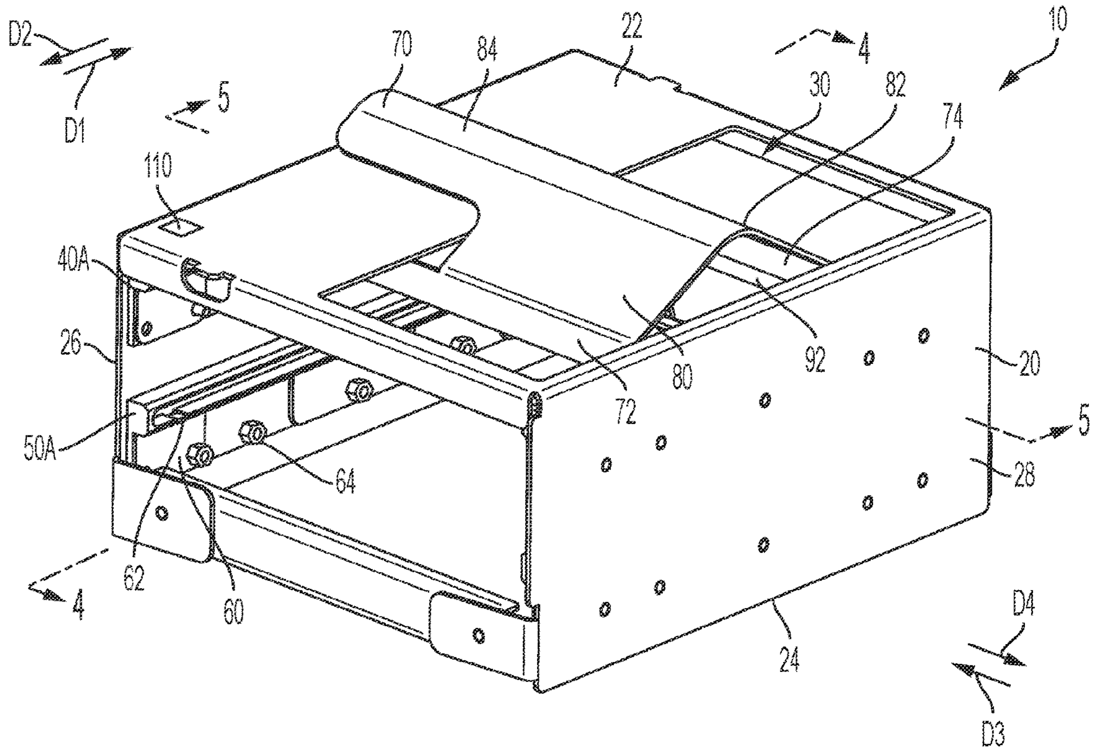
(57) **ABSTRACT**

An adjustable leveling assembly for engaging a stack of a plurality of sheets in a feeder tray of a printing device, including a first wedging element slidably arranged on the feeder tray and operatively arranged to engage the stack, wherein when the first wedging element is disengaged with the stack, a top sheet of the plurality of sheets is non-parallel to the feeder tray, and when the first wedging element is engaged with the stack, the top sheet is substantially parallel to the feeder tray.

**15 Claims, 10 Drawing Sheets**



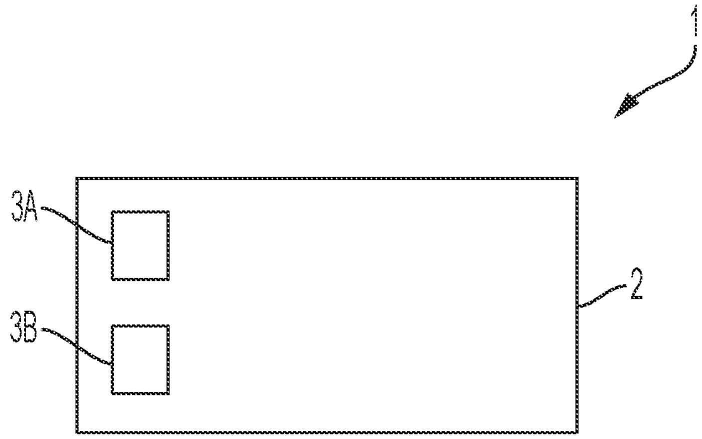



FIG. 1
PRIOR ART

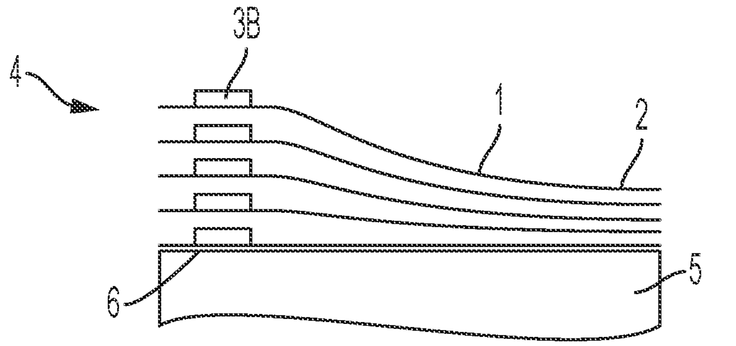



FIG. 2A
PRIOR ART

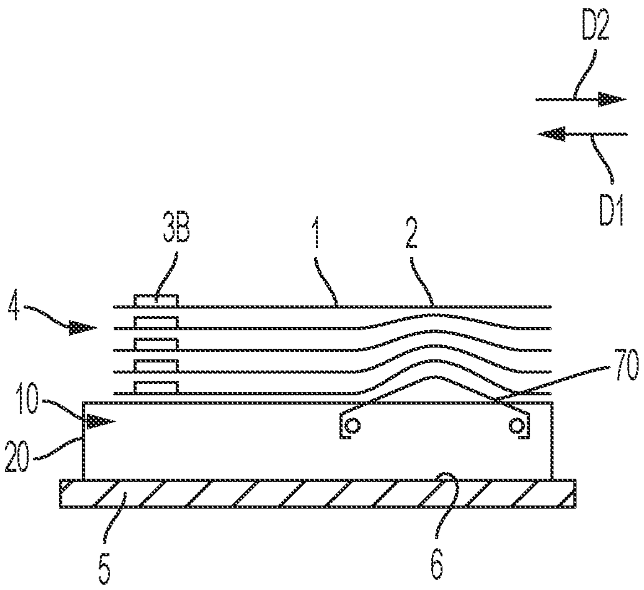
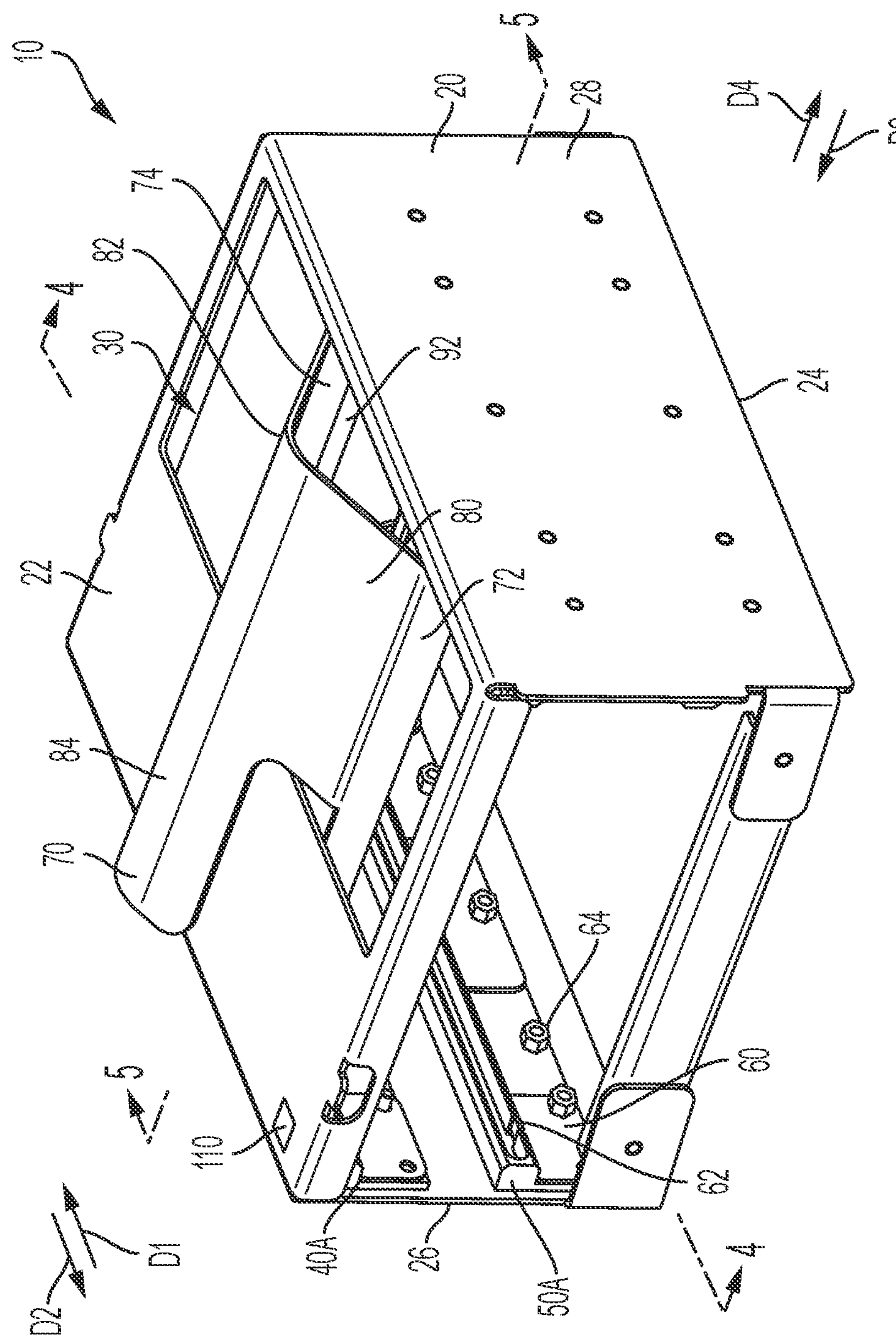



FIG. 2B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5
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28
D4
D3
74
82
4
30
92
22
80
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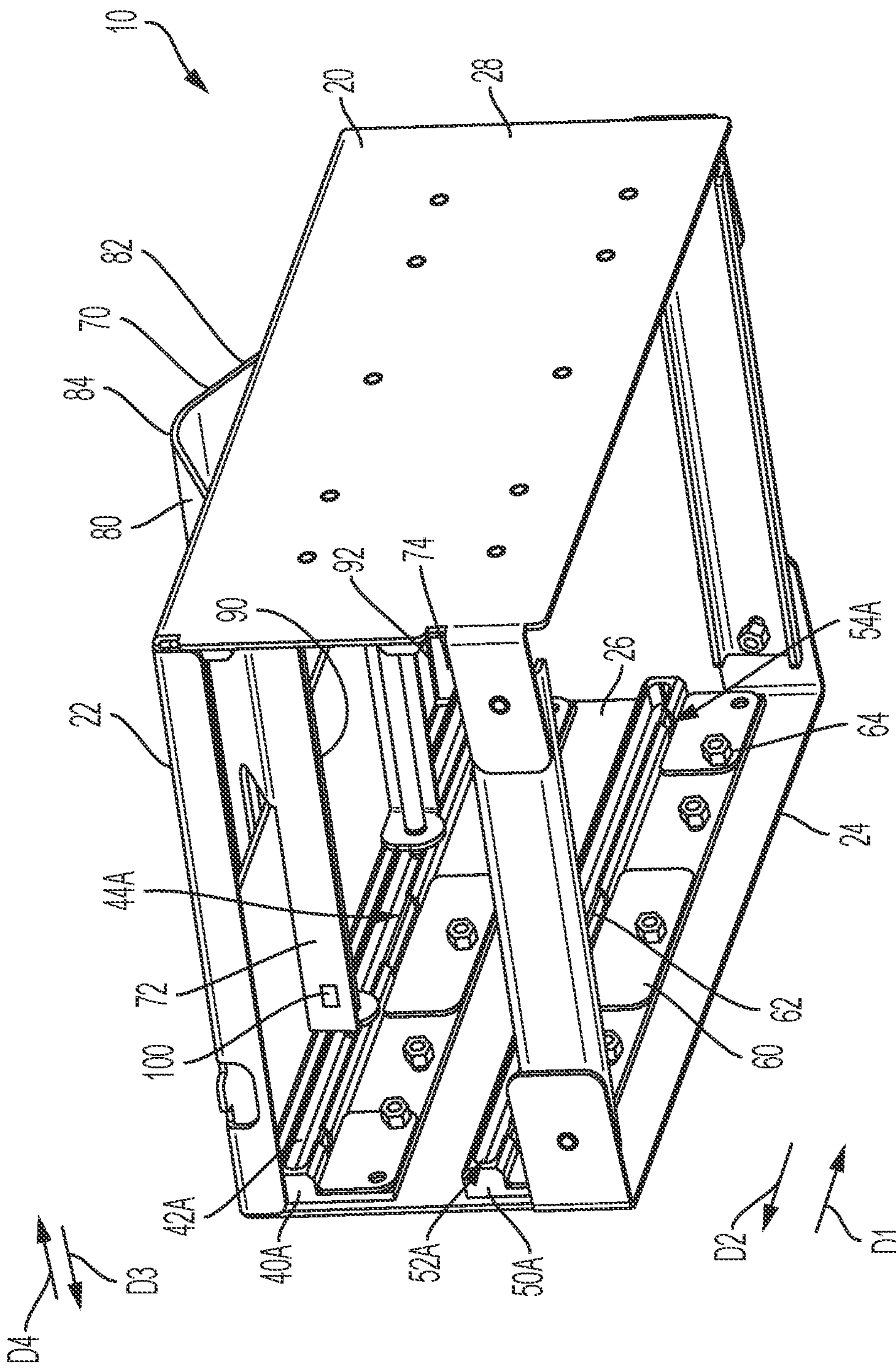
5
110
62
40A
26
50A
4
D1
D2

FIG. 3A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42A
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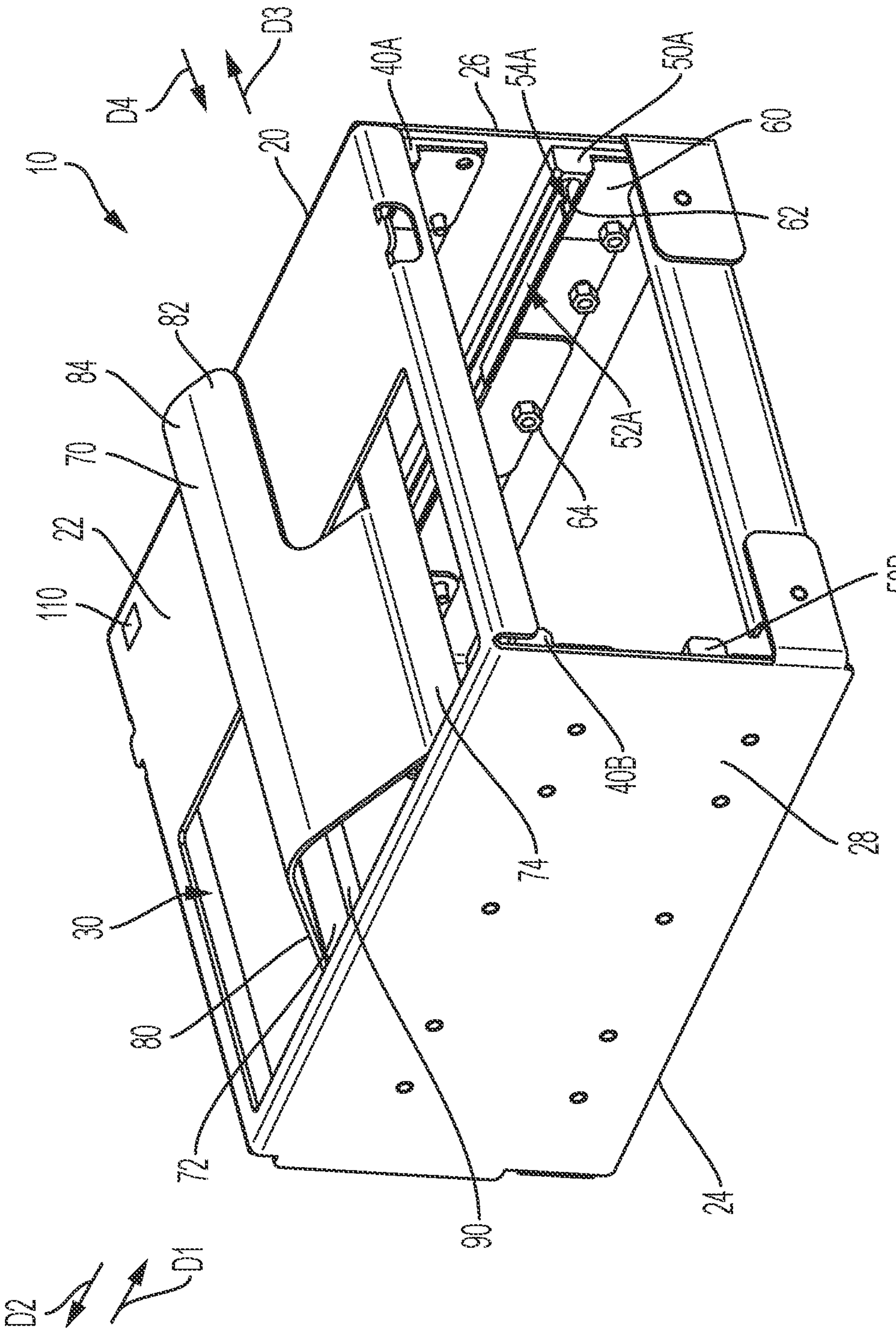
52A
50A
D1
D2
D3
D4

FIG. 3B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40B
28
74
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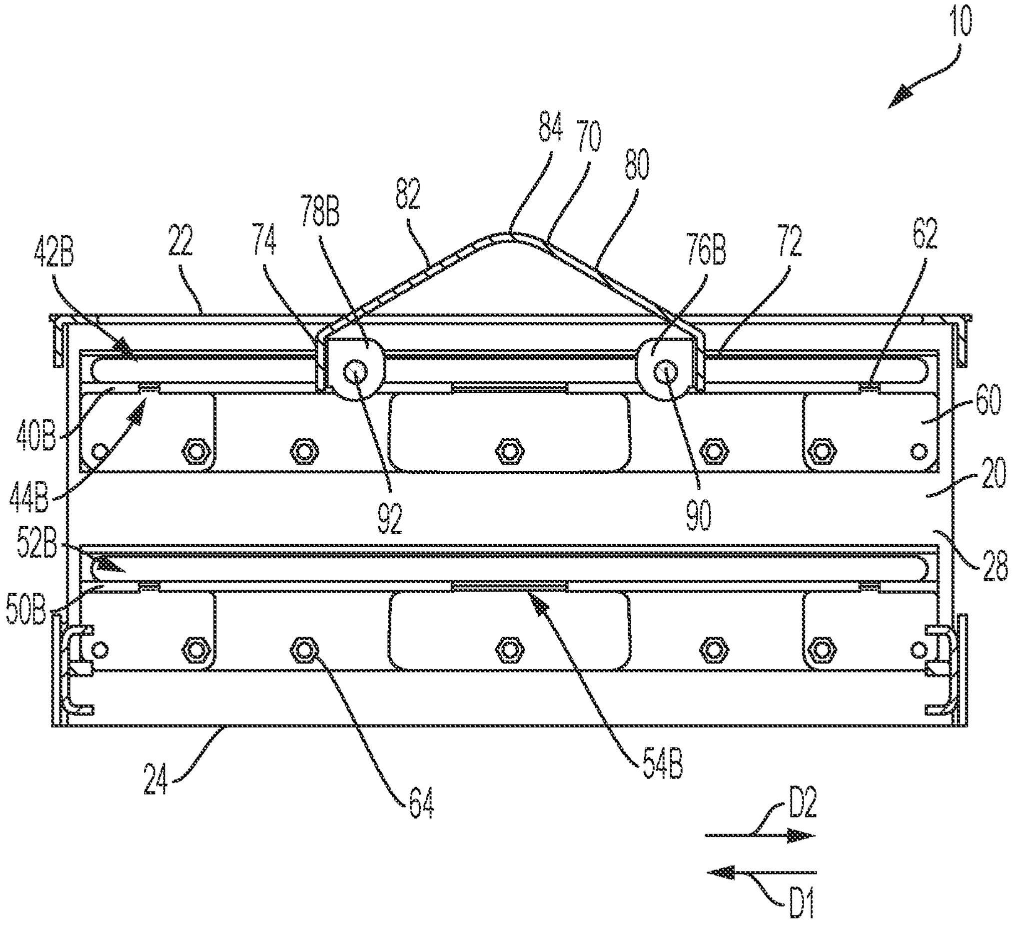
80
72
90
24
D2
D1

FIG. 3C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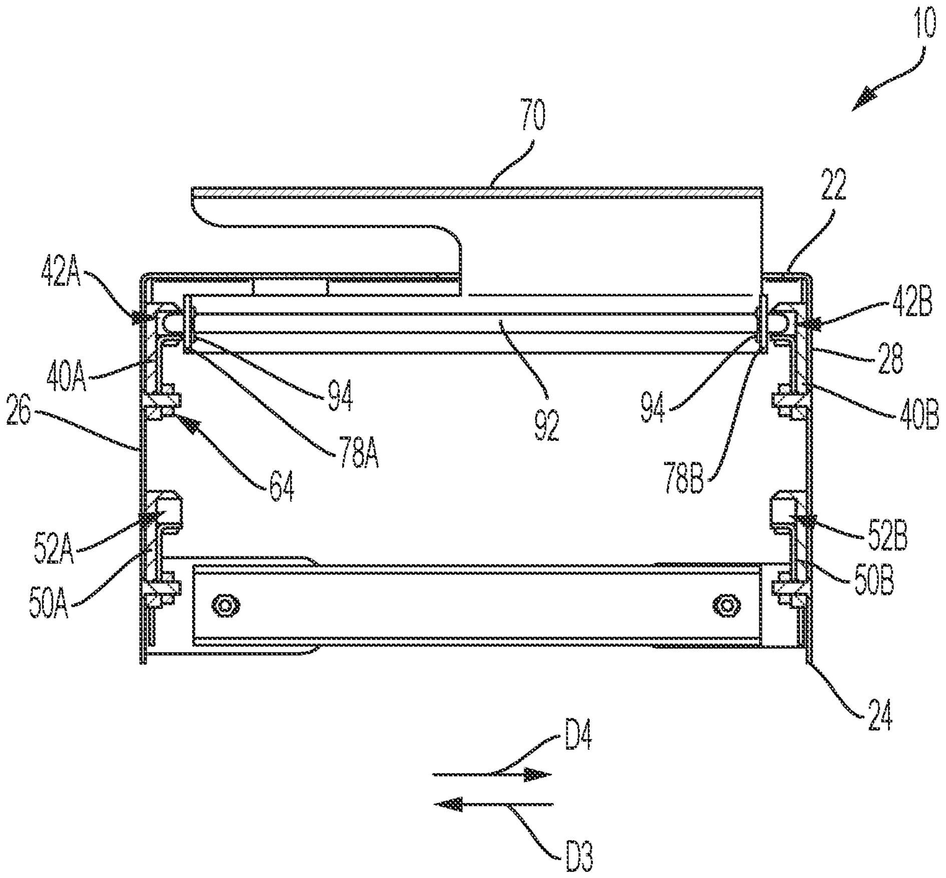
52B
28
50B
24
64
54B
D2
D1

FIG. 4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42B
28
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94
92
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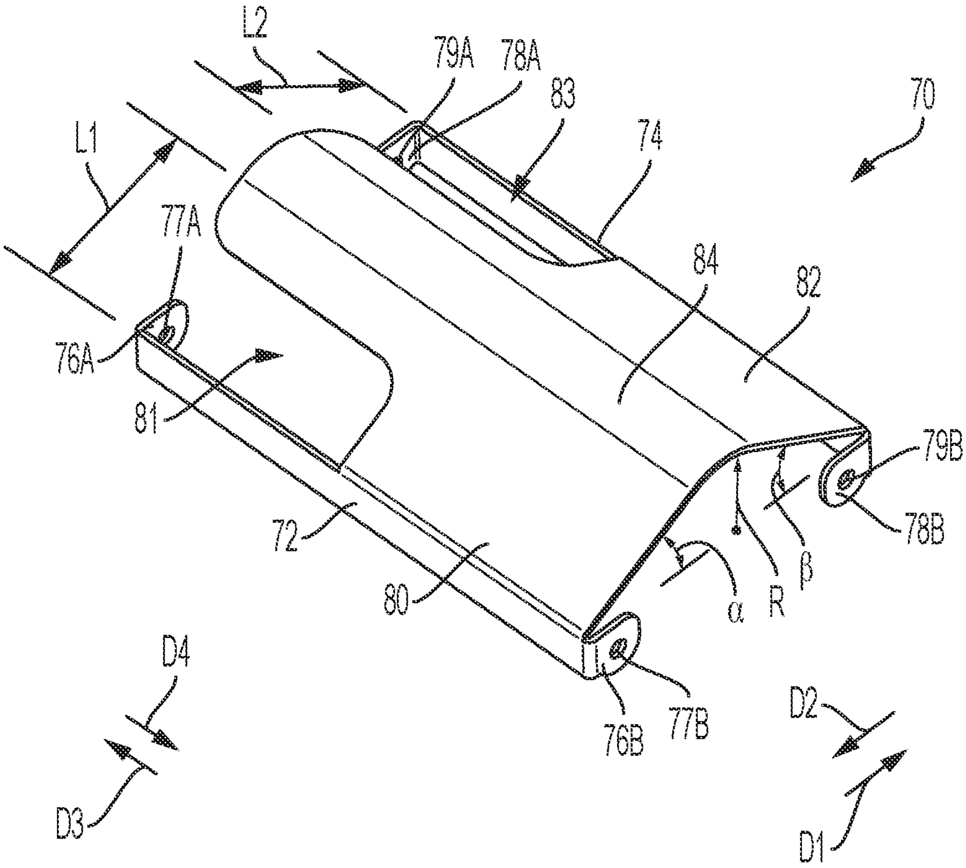
52B
50A
50B
24
D4
D3

FIG. 5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79A
78A
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74
L1
77A
84
82
76A
81
79B
78B
72
R
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80
76B
77B
D4
D3
D2
D1

FIG. 6

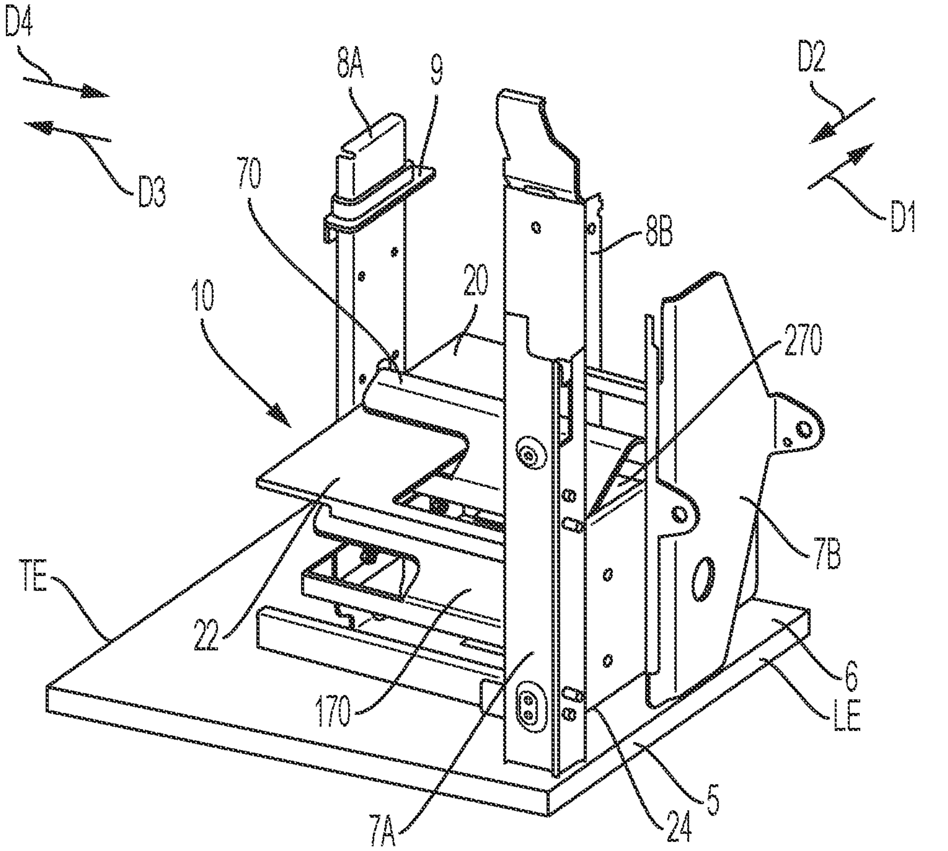


FIG. 7

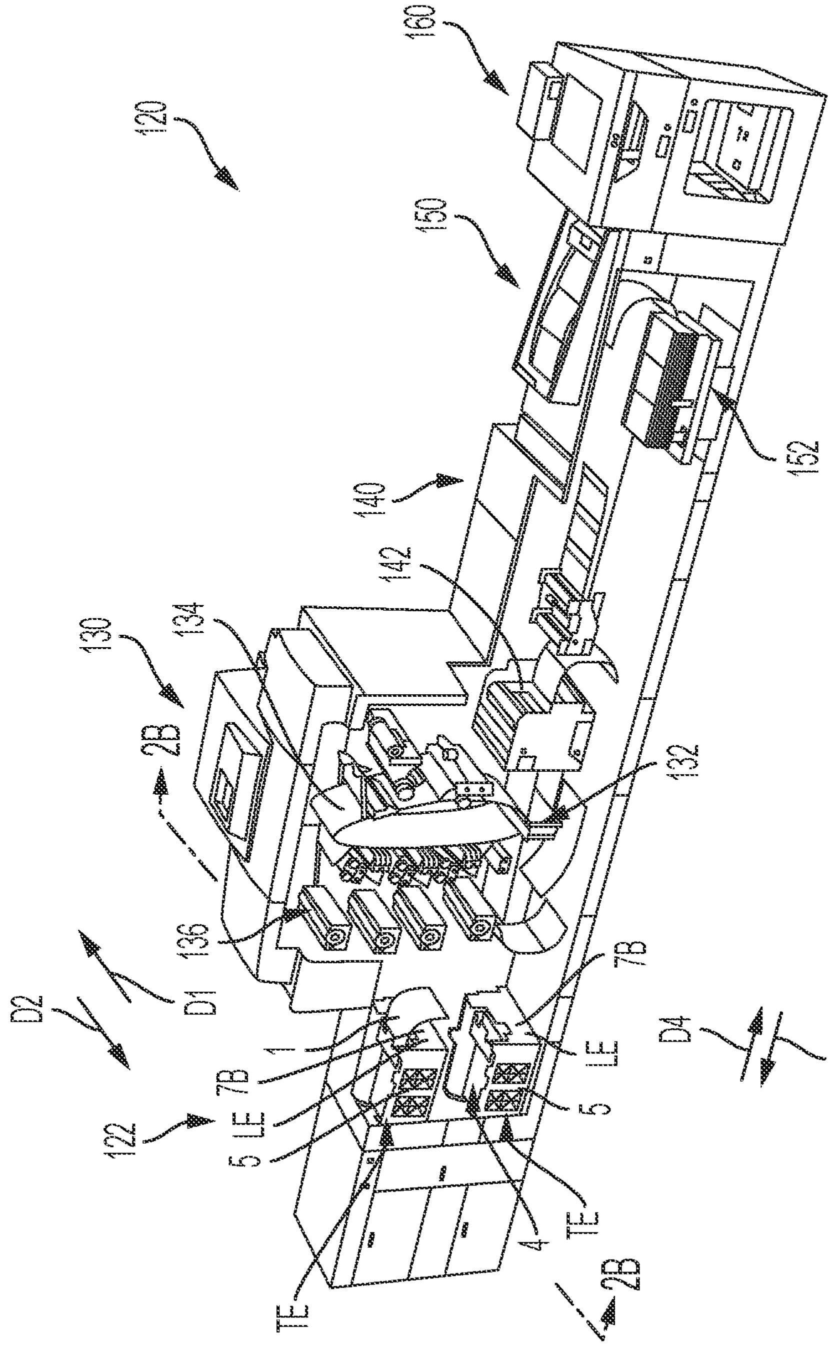
120
160
150
152
140
142
134
130
2B
132
136
D2
D1
1
7B
LE
5
122
TE
4
TE
5
LE
7B
D4
D3
2B

FIG. 8

# FEEDER TRAY ADJUSTABLE LEVELING ASSEMBLY FOR SPECIALTY MEDIA

## FIELD

The present disclosure relates to the field of printing, and more particularly, to the field of printing specialty media that results in irregular thickness when stacked, and even more particularly, to an adjustable leveling assembly for specialty media that results in irregular thickness when stacked.

## BACKGROUND

Current printers and printing systems allow for the feeding of specialty stocks with cards, labels, and stickers. For example, custom or specialty media or sheets exist that allow for users to print out cards (e.g., business cards, greeting cards, post cards, etc.), labels, stickers etc. These custom sheets might comprise a full sheet geometry with the card, label, and/or sticker arranged at a first end of the end of the sheet.

When too many of these custom sheets are arranged on the feeder tray forming a stack, the top surface of the stack is higher in one corner, at one end of the stack, or in the middle of the stack causing the feeder tray height sensor therein to read incorrectly and cause misfeeds. As such, current printers and printing systems are limited to only stacking small quantities of custom sheets in the feeder tray due to the unlevel geometry of the stack of sheets.

Furthermore, current devices to remedy the unlevel geometry of the stack of custom or specialty sheets only allow for short edge feeding, which users do not prefer due to slower productivity, and provide a flat linear ramp, spring loaded across one side, only allowing for cards with uniform geometry across the end. Such current devices do not allow for media that has one card in a corner or one card or label in the middle.

Therefore, there is a long felt need for an adjustable leveling assembly for specialty media that can be arranged in current print feeder trays to enable level stacks of specialty media.

## SUMMARY

According to aspects illustrated herein, there is provided an adjustable leveling assembly for engaging a stack of a plurality of sheets in a feeder tray of a printing device, comprising a first wedging element slidably arranged on the feeder tray and operatively arranged to engage the stack, wherein when the first wedging element is disengaged with the stack, a top sheet of the plurality of sheets is non-parallel to the feeder tray, and when the first wedging element is engaged with the stack, the top sheet is substantially parallel to the feeder tray.

In some embodiments, the adjustable leveling assembly further comprises a body, including a top surface, and a bottom surface operatively arranged to engage the feeder tray, wherein the first wedging element is slidably connected to the body. In some embodiments, the body further comprises a first side wall extending from the top surface to the bottom surface, and a second side wall extending from the top surface to the bottom surface, the second side wall spaced apart from the first side wall. In some embodiments, the first wedging element comprises a first cross-member engaged with the first side wall and the second side wall, a second cross-member engaged with the first side wall and the second side wall, the second cross-member spaced apart from the first cross-member, and at least one surface that extends between the first cross-member and the second cross-member. In some embodiments, the at least one surface comprises a first surface extending from the first cross-member, a second surface extending from the second cross-member, and a third surface connecting the first surface and the second surface. In some embodiments, the first surface and the second surface are planar, and the third surface is curvilinear. In some embodiments, the adjustable leveling assembly further comprises a cutout arranged in at least one of the first surface and the second surface. In some embodiments, the first cross-member and the second cross-member are arranged below the top surface, and the at least one surface is arranged above the top surface. In some embodiments, the top surface comprises an aperture and the at least one surface extends through the aperture. In some embodiments, the adjustable leveling assembly further comprises a first pair of tracks, wherein the first wedging element is engaged with the first pair of tracks via at least one roller. In some embodiments, the adjustable leveling assembly further comprises a second pair of tracks spaced apart from the first pair of tracks and a second wedging element, wherein the second wedging element is engaged with the second pair of tracks. In some embodiments, each track of the first pair of tracks comprises a channel and at least one space. In some embodiments, the adjustable leveling assembly further comprises at least one plate operatively arranged to be removably engaged with the at least one space. In some embodiments, the adjustable leveling assembly further comprising a locking mechanism operatively arranged to fixedly secure the first wedging element with respect to the feeder tray. In some embodiments, the adjustable leveling assembly further comprising a transmission device operatively arranged to transmit data to a remote location. In some embodiments, the first wedging element is slidably displaceable relative to the feeder tray in a direction perpendicular to sheet feeding.

According to aspects illustrated herein, there is provided an adjustable leveling assembly for engaging an unlevel stack of a plurality of sheets in a tray of a printing device, comprising a body, including a top surface, and a bottom surface operatively arranged to engage the tray, and a first wedging element slidably connected to the body, the first wedging element operatively arranged to engage the unlevel stack to form a level stack.

In some embodiments, the top surface comprises an aperture, the body further comprises a first side wall extending from the top surface to the bottom surface, and a second side wall extending from the top surface to the bottom surface, the second side wall spaced apart from the first side wall, and the first wedging element extends through the aperture. In some embodiments, the first wedging element comprises a first cross-member engaged with the first side wall and the second side wall, a second cross-member engaged with the first side wall and the second side wall, and at least one surface that extends between the first cross-member and the second cross-member. In some embodiments, the adjustable leveling assembly further comprises a first channel connected to the first side wall, and a second channel connected to the second side wall, wherein the first wedging element is engaged with the first channel and the second channel via at least one roller. In some embodiments, the adjustable leveling assembly further comprises a third channel connected to the first side wall, a fourth channel connected to the second side wall, and a second wedging element engaged with the third channel and the fourth channel.

According to aspects illustrated herein, there is provided an adjustable leveling assembly for a feeder tray of a printer, comprising a body, including a top surface, and a bottom surface operatively arranged to engage the feeder tray, and a first wedging element slidably connected to the body and operatively arranged to engage a stack of sheets.

In some embodiments, the body further comprises a first side wall extending from the top surface to the bottom surface, and a second side wall extending from the top surface to the bottom surface, the second side wall spaced apart from the first side wall. In some embodiments, the first wedging element comprises a first cross-member engaged with the first side wall and the second side wall, a second cross-member engaged with the first side wall and the second side wall, and at least one surface that extends between the first cross-member and the second cross-member. In some embodiments, the at least one surface comprises a first surface extending from the first cross-member, a second surface extending from the second cross-member, and a third surface connecting the first surface and the second surface. In some embodiments, the first surface and the second surface are planar, and the third surface is curvilinear. In some embodiments, the adjustable leveling assembly further comprises a cutout arranged in at least one of the first surface and the second surface. In some embodiments, the first cross-member and the second cross-member are arranged below the top surface, and the at least one surface is arranged above the top surface. In some embodiments, the top surface comprises an aperture and the at least one surface extends through the aperture. In some embodiments, the adjustable leveling assembly further comprises a first pair of tracks, wherein the first wedging element is engaged with the first pair of tracks via at least one roller. In some embodiments, the adjustable leveling assembly further comprises a second pair of tracks spaced apart from the first pair of tracks and a second wedging element, wherein the second wedging element is engaged with the second pair of tracks. In some embodiments, each track of the first pair of tracks comprises a channel and at least one space. In some embodiments, the adjustable leveling assembly further comprises at least one plate operatively arranged to be removably engaged with the at least one space. In some embodiments, the adjustable leveling assembly further comprises a locking mechanism operatively arranged to fixedly secure the first wedging element to the body. In some embodiments, the adjustable leveling assembly further comprises a transmission device operatively arranged to transmit data to a remote location.

According to aspects illustrated herein, there is provided an adjustable leveling assembly for a feeder tray of a printer, comprising a body, including a top surface including an aperture, a bottom surface operatively arranged to engage the feeder tray, a first side wall extending from the top surface to the bottom surface, and a second side wall extending from the top surface to the bottom surface, the second side wall spaced apart from the first side wall, and a first wedging element slidably connected to the body, extending through the aperture, and operatively arranged to engage a stack of sheets.

In some embodiments, the first wedging element comprises a first cross-member engaged with the first side wall and the second side wall, a second cross-member engaged with the first side wall and the second side wall, and at least one surface that extends between the first cross-member and the second cross-member. in some embodiments, the at least one surface comprises at least one of a planar surface and a curvilinear surface. In some embodiments, the first cross-member and the second cross-member are arranged below the top surface, and the at least one surface is arranged at least partially above the top surface. In some embodiments, the adjustable leveling assembly further comprises a first channel connected to the first side wall and a second channel connected to the second side wall, wherein the first wedging element is engaged with the first channel and the second channel via at least one roller. In some embodiments, the adjustable leveling assembly further comprises a third channel connected to the first side wall, a fourth channel connected to the second side wall, and a second wedging element engaged with the third channel and the fourth channel.

According to aspects illustrated herein, there is provided an adjustable leveling feeder tray, comprising a body, including a top surface, a bottom surface, a first side wall extending from the top surface to the bottom surface, and a second side wall extending from the top surface to the bottom surface, the second side wall spaced apart from the first side wall, and a first wedging element slidably connected to the body, including a first cross-member, a second cross-member, and at least one surface that extends between the first cross-member and the second cross-member, wherein the at least one surface comprises at least one of a planar surface and a curvilinear surface.

According to aspects illustrated herein, there is provided a smart specialty media feeding kit with variable geometry surfaces. The assembly enables specialty media, such as cards, or other additions to the paper surface such as labels, to feed from the tray by changing the geometry of the stack in the feeder tray. The top surface of the pile height of paper is leveled by using a platform placed underneath the stack along with adjustable curved supports underneath the media.

The assembly comprises a rectangular platform and a variety of different shaped curved props and supports that can be moved into an almost infinite number of places or locations on the main platform. Cutouts in the main platform allow the supports to slide into almost any position under the media. The shapes of the curved supports are designed to correct various different types of stacks of media to make the top surface of the stack flat.

The assembly further comprises a wireless component, or a wireless transponder or transmitter, achievable via BLUETOOTH® wireless technology or other radiofrequency identification (RFID) technique, that communicates to a tablet or small screen placed next to the digital front end of the printing device or anywhere else convenient. The screen indicates that the leveling device is installed in the feeder tray (e.g., the screen may display a message: "Smart Feeding Kit Installed. Monitor output at Stacker."). This warning may be necessary because at present, the same paper geometry that hinders feeding (the stack of media prior to entering the printing device, or input) also prevents stacking (the stack of media after exiting the printing device, or output). The user must remember that the capacity for stacking is very limited; even if the user can now place several hundred sheets in the feeder tray by using the smart feeding kit, the sheets in the stacker will be uneven and they will have to unload the sheets while the printing device is running.

The smart feeding kit or assembly is operatively arranged to be placed into any feeder tray of a printing device. In some embodiments, the curved supports or wedging elements can be stored inside the main platform of the kit or assembly. As such, various sized supports can, at the same time, be housed and utilized by the main platform.

In some embodiments, the kit or assembly allows feeding business card stocks and media with irregular thickness in stacks (e.g., multiplatform identification (ID) cards, index inkjet treated ID cards, and any other stocks that will have irregular stack properties). The assembly of the present disclosure enables feeding over 400 sheets at a time into the feeder tray as well long-edge feeding. In some embodiments, the assembly comprises a plurality of peak shapes that can be adjusted to any location on the body surface (i.e., slides linearly there along). In some embodiments, the assembly further comprises a wireless transmission device to alert the user to monitor the output stacker (i.e., the irregular thickness stock will stack uneven in the output stacker and thus must be monitored). The wireless transmission device further communicates its location in the printing device.

These and other objects, features, and advantages of the present disclosure will become readily apparent upon a review of the following detailed description of the disclosure, in view of the drawings and appended claims.

## BRIEF DESCRIPTION OF THE DRAWINGS

Various embodiments are disclosed, by way of example only, with reference to the accompanying schematic drawings in which corresponding reference symbols indicate corresponding parts, in which:

FIG. **1** is a top elevational view of a prior art specialty sheet;

FIG. **2**A is a side elevational view of a prior art stack of specialty sheets arranged on a feeder tray;

FIG. **2**B is a cross-sectional schematic view of the printing device taken generally along line **2**B-**2**B in FIG. **8**;

FIG. **3**A is a front top perspective view of an adjustable leveling assembly;

FIG. **3**B is a front bottom perspective view of the adjustable leveling assembly shown in FIG. **3**A;

FIG. **3**C is a rear top perspective view of the adjustable leveling assembly shown in FIG. **3**A;

FIG. **4** is a cross-sectional view of the adjustable leveling assembly taken generally along line **4**-**4** in FIG. **3**A;

FIG. **5** is a cross-sectional view of the adjustable leveling assembly taken generally along line **5**-**5** in FIG. **3**A;

FIG. **6** is a front top perspective view of the wedging element shown in FIG. **3**A;

FIG. **7** is a front top perspective view of an adjustable leveling assembly arranged on a feeder tray; and,

FIG. **8** is a partial perspective view of a printing device.

## DETAILED DESCRIPTION

At the outset, it should be appreciated that like drawing numbers on different drawing views identify identical, or functionally similar, structural elements. It is to be understood that the claims are not limited to the disclosed aspects.

Furthermore, it is understood that this disclosure is not limited to the particular methodology, materials and modifications described and as such may, of course, vary. It is also understood that the terminology used herein is for the purpose of describing particular aspects only, and is not intended to limit the scope of the claims.

Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood to one of ordinary skill in the art to which this disclosure pertains. It should be understood that any methods, devices or materials similar or equivalent to those described herein can be used in the practice or testing of the example embodiments. The assembly of the present disclosure could be driven by hydraulics, electronics, pneumatics, and/or springs.

It should be appreciated that the term "substantially" is synonymous with terms such as "nearly," "very nearly," "about," "approximately," "around," "bordering on," "close to," "essentially," "in the neighborhood of," "in the vicinity of," etc., and such terms may be used interchangeably as appearing in the specification and claims. It should be appreciated that the term "proximate" is synonymous with terms such as "nearby," "close," "adjacent," "neighboring," "immediate," "adjoining," etc., and such terms may be used interchangeably as appearing in the specification and claims. The term "approximately" is intended to mean values within ten percent of the specified value.

It should be understood that use of "or" in the present application is with respect to a "non-exclusive" arrangement, unless stated otherwise. For example, when saying that "item x is A or B," it is understood that this can mean one of the following: (1) item x is only one or the other of A and B; (2) item x is both A and B. Alternately stated, the word "or" is not used to define an "exclusive or" arrangement. For example, an "exclusive or" arrangement for the statement "item x is A or B" would require that x can be only one of A and B. Furthermore, as used herein, "and/or" is intended to mean a grammatical conjunction used to indicate that one or more of the elements or conditions recited may be included or occur. For example, a device comprising a first element, a second element and/or a third element, is intended to be construed as any one of the following structural arrangements: a device comprising a first element; a device comprising a second element; a device comprising a third element; a device comprising a first element and a second element; a device comprising a first element and a third element; a device comprising a first element, a second element and a third element; or, a device comprising a second element and a third element.

Moreover, as used herein, the phrases "comprises at least one of" and "comprising at least one of" in combination with a system or element is intended to mean that the system or element includes one or more of the elements listed after the phrase. For example, a device comprising at least one of: a first element; a second element; and, a third element, is intended to be construed as any one of the following structural arrangements: a device comprising a first element; a device comprising a second element; a device comprising a third element; a device comprising a first element and a second element; a device comprising a first element and a third element; a device comprising a first element, a second element and a third element; or, a device comprising a second element and a third element. A similar interpretation is intended when the phrase "used in at least one of:" is used herein. Furthermore, as used herein, "and/or" is intended to mean a grammatical conjunction used to indicate that one or more of the elements or conditions recited may be included or occur. For example, a device comprising a first element, a second element and/or a third element, is intended to be construed as any one of the following structural arrangements: a device comprising a first element; a device comprising a second element; a device comprising a third element; a device comprising a first element and a second element; a device comprising a first element and a third element; a device comprising a first element, a second element and a third element; or, a device comprising a second element and a third element.

"Printer," "printer system," "printing system," "printer device," "printing device," and "multi-functional device

(MFD)" as used herein encompass any apparatus, such as a digital copier, bookmaking machine, facsimile machine, multi-function machine, etc., which performs a print outputting function for any purpose.

Furthermore, as used herein, "sheet," "web," "substrate," "printable substrate," and "media" refer to, for example, paper, transparencies, parchment, film, fabric, plastic, photo-finishing papers, or other coated or non-coated substrate media in the form of a web upon which information or markings can be visualized and/or reproduced. By specialty sheet it is meant a sheet which includes a card, label, sticker, or other element that is thicker than the substrate on or in which it resides.

Referring now to the figures, FIG. **1** is a top elevational view of prior art specialty sheet **1**. As shown, specialty sheet **1** comprises substrate **2** and at least one card or label or sticker, for example, cards **3**A-B. Cards **3**A-B have a thickness that is greater than substrate **2**.

FIG. **2**A is a side elevational view of a prior art stack of specialty sheets **1** arranged on feeder tray **5** of a printing device. As shown, a plurality of specialty sheets **1** are stacked on top of each other forming stack **4** on surface **6** of feeder tray **5**. Because cards **3**A-B have a greater thickness than substrate **2**, stack **4** comprises an uneven geometry, which causes feeding issues. As such, stack **4** as shown in FIG. **2** is said to be unlevel. By unlevel stack or unlevel, it is meant that the top sheet **1** of stack **4** is non-parallel to surface **6** or feeder tray **5**. As previously described, such an unlevel stack causes issues with sheet feeding (input) or stacking (output).

FIG. **2**B is a cross-sectional schematic view of printing device **120** taken generally along line **2**B-**2**B in FIG. **8**. As shown, feeder tray **5** is modified by the arrangement of adjustable leveling assembly **10** on surface **6** (i.e., a removable mechanical modification). After arranging adjustable leveling assembly **10** on feeder tray **5**, wedging element **70** is adjusted in direction D**4** such that stack **4** is substantially level at its top sheet. As shown, wedging element **70** is displaced in direction D**2** to offset the excessive elevation of stack **4** created by cards **3**B. It should be appreciated that such a removable mechanical modification can also be implemented in stacker **152** (see FIG. **8**) for example, with a second adjustable wedging element **10**. Stack **4** as shown in FIG. **2**B is said to be level. By level stack or level, it is meant that the top sheet **1** of stack **4** is parallel or substantially parallel to surface **6** or feeder tray **5**. As previously described, such a level stack corrects any issues with sheet feeding (input) or stacking (output) caused by an unlevel stack. In some embodiments, wedging element **70** is slidably connected to feeder tray **5** along a direction perpendicular to sheet feeding or movement, namely, in direction D**1** and direction D**2**, with direction D**4** being the direction of paper feeding. In some embodiments, wedging element **70** is slidably connected to feeder tray **5** along a direction of or parallel to sheet feeding or movement, namely, in direction D**3** and direction D**4**, with direction D**4** being the direction of paper feeding.

FIG. **3**A is a front top perspective view of adjustable leveling assembly **10**. FIG. **3**B is a front bottom perspective view of adjustable leveling assembly **10**. FIG. **3**C is a rear top perspective view of adjustable leveling assembly **10**. FIG. **4** is a cross-sectional view of adjustable leveling assembly **10** taken generally along line **4**-**4** in FIG. **3**A. FIG. **5** is a cross-sectional view of adjustable leveling assembly **10** taken generally along line **5**-**5** in FIG. **3**A. FIG. **6** is a front top perspective view of wedging element **70**. Adjustable leveling assembly **10** generally comprises body **20** and wedging element **70**. In some embodiments, adjustable leveling assembly **10** further comprises one or more tracks or brackets, for example, tracks **40**A-B and **50**A-B. The following descriptions should be read in view of FIGS. **1**-**6**.



Body **20** comprises top surface **22**, bottom surface **24**, side wall **26**, and side wall **28**. Bottom surface **24** is operatively arranged to engage, or be placed on top of, surface **6** of feeder tray **5** of a printing device. In some embodiments, bottom surface **24** is operatively arranged to be removably connected to top surface **6** of feeder tray **5**. Top surface **22** is arranged substantially parallel to bottom surface **24** to engage a plurality of specialty sheets **1**, namely, stack **4**. In some embodiments, top surface **22** is arranged unparallel to bottom surface **24**. Side wall **26** extends top surface **22** to bottom surface **24**. Side wall **26** is connected to top surface **22** and bottom surface **24**. In some embodiments, side wall **26** is fixedly secured to top surface **22** and bottom surface **24**. Body **20** is generally box-shaped or shaped like a rectangular prism or cube, with open ends. However, it should be appreciated that the overall height of body **20** (i.e., the height of side walls **26** and **28**) may be increased or decreased based on the printing device. Additionally, the dimensions of top surface **22** (i.e., length and width) may be adjusted for various size sheets (e.g., A0, A1, A2, letter, legal, tabloid, etc.). Top surface **22** comprises aperture **30**. Aperture **30** is operatively arranged to engage wedging element **70** such that surfaces **80**, **82**, **84** protrude through top surface **22**, as will be described in greater detail below.

In some embodiments, adjustable leveling assembly **10** further comprises tracks **40**A-B and **50**A-B. Track **40**A is connected to side wall **26** and comprises channel **42**A. Channel **42**A is operatively arranged to engage wedging element **70**, specifically rollers or axels **90** and **92**, as will be described in greater detail below. In some embodiments, channel **42**A comprises one or more spaces **44**A. Spaces **44**A allow rollers **90** and **92** to disengage channels **42**A such that wedging element **70** can be removed from track **40**A.

Track **40**B is connected to side wall **28** and comprises channel **42**B. Channel **42**B is operatively arranged to engage wedging element **70**, specifically rollers or axels **90** and **92**, as will be described in greater detail below. In some embodiments, channel **42**B comprises one or more spaces **44**B. Spaces **44**B allow rollers **90** and **92** to disengage channels **42**B such that wedging element **70** can be removed from track **40**B.

Track **50**A is connected to side wall **26** and comprises channel **52**A. Channel **52**A is operatively arranged to engage wedging element **70**, specifically rollers or axels **90** and **92**, as will be described in greater detail below. In some embodiments, channel **52**A comprises one or more spaces **54**A. Spaces **54**A allow rollers **90** and **92** to disengage channels **52**A such that wedging element **70** can be removed from track **50**A.

Track **50**B is connected to side wall **28** and comprises channel **52**B. Channel **52**B is operatively arranged to engage wedging element **70**, specifically rollers or axels **90** and **92**, as will be described in greater detail below. In some embodiments, channel **52**B comprises one or more spaces **54**B. Spaces **54**B allow rollers **90** and **92** to disengage channels **52**B such that wedging element **70** can be removed from track **50**B.

Tracks **40**A and **40**B are aligned and are operatively arranged to slidingly engage the "in-use" wedging element or wedging elements **70**. By "in-use" it is meant that wedging element **70** protrudes through top surface **22** to engage sheets arranged thereon. Tracks **50**A and **50**B are aligned and are operatively arranged to slidingly engage the "stored" wedging element or wedging elements **170** and/or **270** (see FIG. **7**). By "stored" it is meant that wedging element **170**, **270** does not protrude through top surface **22**, but rather resides completely between top surface **22** and bottom surface **24**. In some embodiments, tracks **40**A-B and **50**A-B are connected to side walls **26** and **28** via bolts and nuts **64**. It should be appreciated, however, that tracks **40**A-B and **50**A-B can be connected to side walls **26** and **28** via any suitable means, for example, screws, rivets, nails, pins, dowels, soldering, welding, adhesives, etc. It should also be appreciated that in some embodiments that tracks **40**A-B and **50**A-B are integrally formed with or in side walls **26** and **28** (i.e., channels that tracks **42**A-B and **52**A-B can be arranged directly in side walls **26** and **28**).

In some embodiments, adjustable leveling assembly **10** further comprises one or more plates **60**. Each of plates **60** comprises flange **62**. Plates **60** are operatively arranged to be removably secured to side walls **26** and **28**, or more specifically to tracks **40**A-B and **50**A-B, to block spaces **44**A-B and **54**A-B. For example, a user will select the wedging element with the desired dimensions and geometry, for example wedging element **70**. Wedging element **70** is then inserted into in-use tracks **40**A-B, specifically, into channels **42**A-B through spaces **44**A-B. Once rollers **90** and **92** are engaged with channels **42**A-B, one or more plates **60** are secured to side walls **26** and **28**, or tracks **40**A and **40**B, such that flanges **64** block spaces **44**A-B to trap rollers **90** and **92** in channels **42**A-B. The width of flanges **64** should be substantially equal to or just less than the width of spaces **44**A-B to ensure that rollers **90** and **92** do not inadvertently fall out of channels **42**A-B.

Similarly, the non-selected wedging elements are placed in stored tracks **50**A-B, specifically in channels **52**A-B through spaces **54**A-B. Plates **60** are then secured to side walls **26** and **28**, or tracks **50**A and **50**B, such that flanges **64** block spaces **54**A-B to trap rollers **90** and **92** in channels **52**A-B. The width of flanges **64** should be substantially equal to or just less than the width of spaces **54**A-B to ensure that rollers **90** and **92** do not inadvertently fall out of channels **52**A-B. Plates **64** can be removably connected to side walls **26** and **28**, or tracks **50**A and **50**B, via any suitable means, for example, bolts, screws, nails, pegs, dowels, pins, rivets, snaps, etc.

Wedging element **70** is slidingly engaged with body **20**. Wedging element **70** comprises cross-member **72**, cross-member **74**, and surfaces **80**, **82**, and **84**. Cross-member **72** is slidingly engaged with side wall **26** and side wall **28**, specifically, track **40**A and track **40**B. In some embodiments, cross-member **72** comprises flange **76**A on a first end thereof and flange **76**B on a second end thereof. In some embodiments, flange **76**A is arranged perpendicular to cross-member **72**. In some embodiments, flange **76**A is arranged non-perpendicular to cross-member **72**. In some embodiments, flange **76**A extends in direction D**1** or direction D**2** from cross-member **72**. In some embodiments, flange **76**B is arranged perpendicular to cross-member **72**. In some embodiments, flange **76**B is arranged non-perpendicular to cross-member **72**. In some embodiments, flange **76**B extends in direction D**1** or direction D**2** from cross-member **72**. Flange **76**A and flange **76**B comprise through-bore **77**A and through-bore **77**B, respectively.

Cross-member **74** is slidingly engaged with side wall **26** and side wall **28**, specifically, track **40**A and track **40**B. In some embodiments, cross-member **74** comprises flange **78**A on a first end thereof and flange **78**B on a second end thereof. In some embodiments, flange **78**A is arranged perpendicular to cross-member **74**. In some embodiments, flange **78**A is arranged non-perpendicular to cross-member **74**. In some embodiments, flange **78**A extends in direction D**1** or direction D**2** from cross-member **74**. In some embodiments, flange **78**B is arranged perpendicular to cross-member **74**. In some embodiments, flange **78**B is arranged non-perpendicular to cross-member **74**. In some embodiments, flange **78**B extends in direction D**1** or direction D**2** from cross-member **74**. Flange **78**A and flange **78**B comprise through-bore **79**A and through-bore **79**B, respectively.

Surface **80** is connected to and extends from cross-member **72**. Surface **80** comprises length L**1** and is arranged at angle α relative to cross-member **72** (i.e., a horizontal plane drawn between cross-members **72** and **74**). In some embodiments, surface **80** is planar. In some embodiments, surface **80** is curvilinear. It should be appreciated that length L**1** and angle α of surface **80**, as well as its geometry (e.g., planar, curvilinear, or both planar and curvilinear) can be adjusted for any unlevel geometry of stack **4**. In some embodiments, and as shown, surface **80** comprises cutout **81** extending from a first end thereof in direction D**4**. Cutout **81** allows wedging element **70** to engage top surface **22**. Thus, top surface **22** engages cutout **81** such that wedging element **70** can slide or displace relative to body **20** (i.e., surface **80** is arranged above top surface **22** and cross-member **72** is arranged below top surface **22**).

Surface **82** is connected to and extends from cross-member **74**. Surface **82** comprises length L**2** and is arranged at angle β relative to cross-member **74** (i.e., a horizontal plane drawn between cross-members **72** and **74**). In some embodiments, surface **82** is planar. In some embodiments, surface **82** is curvilinear. It should be appreciated that length L**2** and angle β of surface **82**, as well as its geometry (e.g., planar, curvilinear, or both planar and curvilinear) can be adjusted for any unlevel geometry of stack **4**. In some embodiments, length L**2** is equal to length L**1**. In some embodiments, length L**2** is not equal to length L**1**. In some embodiments, angle β is equal to angle α. In some embodiments, angle β is not equal to angle α. In some embodiments, and as shown, surface **82** comprises cutout **83** extending from a first end thereof in direction D**4**. Cutout **83** allows wedging element **70** to engage top surface **22**. Thus, top surface **22** engages cutout **83**, and cutout **81**, such that wedging element **70** can slide or displace relative to body **20** (i.e., surface **82** is arranged above top surface **22** and cross-member **74** is arranged below top surface **22**).

Surface **84** is connected to and extends from surface **80** and surface **82**. In some embodiments, surface **84** is curvilinear and comprises radius R. In some embodiments, surface **84** is planar. Surface **84** forms the peak or the highest point of wedging element **70**. It should be appreciated that the dimensions of wedging element **70**, namely, length L**1**, length L**2**, radius R, angle α, angle β, and the geometry of surfaces **80**, **82**, and **84** are to be chosen such that when stack **4** is arranged on wedging element **70** and top surface **22**, the top surface of stack **4** is level. This might require a wedging element having two separate and distinct peaks, or a S-shaped geometry.

As shown, cross-members **72** and **74** are arranged below top surface **22** while surfaces **80**, **82**, and **84** protrude through and extend above top surface **22**. This allows specialty sheets **1**, or more specifically stack **4**, to engage both wedging element **70** and top surface **22**. This arrangement also wedging element **70** to be displaced while stack **4** is arranged on adjustable leveling assembly **10** (i.e., stack **4** can be placed on top of surfaces **80**, **82**, and/or **84** and wedging element **70** can subsequently be adjusted relative to body **20**).

As previously described, wedging element **70** is slidingly engaged with body **20** such that wedging element **70** is displaceable in directions D**1** and D**2** with respect to body. In some embodiments, adjustable leveling assembly **10** comprises rollers or axels **90** and **92**. Roller **90** extends through cross-member **72**, specifically through-bores **77**A-B of flanges **76**A-B, respectively, and engages tracks **40**A-B. Roller **90** is rotatably connected to wedging element **70**, and is secured axially thereto via one or more retaining elements or retaining rings **94**. Retaining elements **94** may be arranged in a groove in roller **90**. Roller **92** extends through cross-member **74**, specifically through-bores **79**A-B of flanges **78**A-B, respectively, and engages tracks **40**A-B. Roller **92** is rotatably connected to wedging element **70**, and is secured axially thereto via one or more retaining elements or retaining rings **94** (see FIG. **5**). Retaining elements **94** may be arranged in a groove in roller **90**. It should be appreciated that wedging element **70**, specifically, cross-members **72** and **74**, may be slidingly engaged with body **20** via any suitable means.

In some embodiments, adjustable leveling assembly **10** comprises locking mechanism **100** operatively arranged to lock wedging element **70** with respect to body **20** (see FIG. 3B). In such embodiments, a wedging element having a suitable geometry is selected, for example wedging element **70**, and arranged in in-use tracks **40**A-B. The non-selected wedging elements, for example wedging elements **170**, **270**, are arranged in stored tracks **50**A-B (see FIG. **7**). Wedging element **70** is then displaced in direction D**1** or direction D**2** with respect to body **20** until positioned in its desired location. Then locking mechanism **100** is engaged to fix wedging element **70** in that position. It should be appreciated that any locking mechanism suitable for temporarily fixing wedging element **70** with respect to body **20** may be used, for example, set screws, bolts, screws, rivets, magnets, cotter pins, retaining rings and elements, friction, etc. It should also be appreciated that in some embodiments, wedging element **70** may be more permanently fixed with respect to body **20** using, for example, adhesives, welding, soldering, etc. Locking mechanism **100** can also be arranged on any component. For example, while locking mechanism **100** is shown arranged on wedging element **70**, it can also be arranged on body **20**, tracks **40**A and/or **40**B, or rollers **90** and/or **92**. Furthermore, a locking mechanism or mechanisms can be employed to fix the non-selected wedging elements (i.e., wedging elements **170**, **270**) arranged in the stored tracks **50**A-B to body **20**.

FIG. **7** is a front top perspective view of adjustable leveling assembly **10** arranged on feeder tray **5**. As shown, adjustable leveling assembly **10** comprises body **20**, one in-use wedging element **70**, and two stored wedging elements **170** and **270**. Body **20** is arranged such that bottom surface **24** is engaged with feeder tray **5**. Bottom surface **24** may be removably connected to, or arranged on top of, surface **6** of feeder tray **5**. Feeder tray **5**, and specifically the printing device, may comprise static side walls **7**A-B, which abut against or are arranged adjacent to body **30**. Feeder tray **5**, and specifically the printing device, may further comprise movable guides **8**A-B. Moveable guide **8**A is operatively arranged to displace in directions D3 and D4, and moveable guide **8**B is operatively arranged to displace in directions D1 and D2. Static side walls and moveable guides are known in the art and are arranged adjacent feeder tray **5** to maintain alignment of the stack of sheets arranged thereon. Moveable guide **8**A may comprise a paper trail edge **9** that indicates the top of the stack of sheets arranged on feeder tray **5**. The sheets in the stack are fed to the printing device in direction D**4**, over the top of static side wall 7B.

Adjustable leveling assembly **10** arranged on surface **6** of feeder tray **5** and between static side walls **7**A-B and moveable guides **8**A-B. As previously described, the dimensions of body **20**, specifically top surface **22**, are chosen to correspond to the sheet size to be arranged thereon (e.g., A3, A4, A5, letter, etc.). The dimensions and geometry (e.g., length L**1**, length L**2**, radius R, angle α, angle β, etc.) of the in-use wedging element **70** are chosen based on the curvature or unlevel geometry of stack **4** such that, when stack **4** is arranged on wedging element **70** and top surface **22**, the top of stack **4** is level or otherwise planar.

Stored wedging elements **170** and **270** are substantially similar to wedging element **70** with respect to its elements; however, wedging elements **170** and **270** are different from wedging element **70** with respect to their dimensions and geometry. Since wedging elements **70**, **170**, and **270** each differ in dimensions and geometry from each other, a user can select a wedging element for specific specialty sheets **1**. For example, the user would select the wedging element that, when specialty sheets **1** are arranged thereon, results in a level top surface of stack **4**. The other wedging elements can be stored on tracks **50**A-B. It should be further appreciated that a user may select two in-use wedging elements. In such embodiments, two wedging elements are arranged in tracks **40**A-B to create a custom curvature, for example, having two peaks.

In some embodiments, adjustable leveling assembly **10** further comprises wireless communication device or transponder or transmitter or transmission device **110**. Wireless communication device **110** is operatively arranged to transmit data to a remote location. In some embodiments, the transmitted data indicates the location of adjustable leveling assembly **10** geographically. In some embodiments, the transmitted data indicates which printing device or feeder tray adjustable leveling assembly is arranged in. This is desirable because a single location (i.e., building) may have a plurality of printing devices but only one adjustable leveling assembly **10**. As such, it is desirable for users to know which printing device already incorporates adjustable leveling assembly **10** (i.e., if the user needs to print specialty sheets, the user can utilize that specific printer since adjustable leveling assembly **10** is already there). In some embodiments, the transmitted data indicates that the user must attend to the stacker of the printing device, the stacker being the device that stacks the printed sheets, or the output of the printing device. Specialty sheets **1** will again be compiled into a stack at the output stacker of the printing device and thus exhibit an uneven geometry. As such, the user must remove the specialty sheets **1** from the stack during printing to prevent the stack from getting too high. The data may be transmitted to a cellular device or tablet, a computing device, and/or the graphic user interface or digital front end of the printing device.

It should be appreciated that in some embodiments, adjustable leveling assembly **10** is fixedly secured to or integrally formed with feeder tray **5**. Put another way, in such embodiments feeder tray **5** of a printing device incorporates adjustable leveling assembly **10** therein such that top surface **22** can be used for regular sheets without wedging elements **70**, **170**, **270** and for specialty sheets with wedging elements **70**, **170**, **270**.

FIG. **8** is a partial perspective view of printing device **120**. In some embodiments, printing unit **120** may be, for example, a XEROX® IGEN® printer, XEROX® BRENVA® printer, or XEROX® BALTORO® printer. Generally, printing device **120** comprises feeder module **122**, print engine tower **130**, fuser module **140**, and output module **150**. In some embodiments, printing device **120** further comprises finishing or post process module **160**. The substrate or printable media travels through printing device **120** in direction D**4**.

Feeder module **122** feeds substrates into print engine tower **130**. Feeder module **122** comprises one or more feeder trays **5**. Feeder trays **5** of feeder module **122** can be modified, for example, with adjustable leveling assembly **10** as described above.

Print engine tower **130** comprises one or more dry ink dispensers, for example, dry ink dispensers **136**, and transfer belt **134**. Although a xerographic (i.e., toner) print engine is shown, adjustable leveling assembly **10** and the method of managing removable modifications to a printing device of the present disclosure can be used in wet ink (i.e., ink jet) or other printing technologies. In some embodiments, print engine tower **130** further comprises image transfer device **132**. Some embodiments, e.g., embodiments including image formation by a dry ink, may benefit by printing systems that include what is known as an acoustic transfer assist (ATA) device. One of ordinary skill in the art will appreciate that printing systems that use a flexible belt in the process of forming an image thereon and subsequently transferring that image from the flexible belt to print media sometimes include one or more ATA devices. ATA devices use acoustic energy to drive the dry ink, e.g., toner, from the belt to the print media. Thus, in some embodiments, image transfer device **132** is an ATA device that assists with transferring a dry ink from a belt to the malleable print media so that no direct contact between the belt and malleable material is necessary. It should be appreciated that such an arrangement may minimize image defects and thereby increase image quality. However, it should also be appreciated that conventional transfer of ink or marking material from a drum or other solid object is also possible.

Fuser module **140** comprises fuser **142**. Fuser **142** applies heat and/or pressure to the printable media or specialty sheet **1** to fuse dry ink to substrate **2**, card **3**A, and/or card **3**B. In some embodiments, fuser **142** comprises two rollers through which specialty sheet **1** is passed through. Print engine tower **130** and fuser module **140** apply or "print" and fuse ink onto substrate **2**, card **3**A, and/or card **3**B.

Output module **150** presents the finished printable media for retrieval. Output module **150** comprises stacker **152** that stacks the finished sheets, for example, specialty sheets **1**.

Finishing module **160** applies various finishing details to the print job, for example, stapling, hole punching, binding, lamination, etc.

It will be appreciated that various aspects of the disclosure above and other features and functions, or alternatives thereof, may be desirably 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.

LIST OF REFERENCE NUMERALS

**1** Specialty sheet
**2** Substrate
**3**A Card or label or sticker
**3**B Card or label or sticker
**4** Stack
**5** Feeder tray
**6** Surface
**7**A Static wall
**7**B Static wall
**8**A Movable guide
**8**B Movable guide
**9** Paper trail edge
**10** Adjustable leveling assembly
**20** Body
**22** Top surface
**24** Bottom surface
**26** Side wall
**28** Side wall
**30** Aperture
**40**A Track
**40**B Track
**42**A Channel
**42**B Channel
**44**A Spaces
**44**B Spaces
**50**A Track
**50**B Track
**52**A Channel
**52**B Channel
**54**A Spaces
**54**B Spaces
**60** Plate(s)
**62** Flange(s)
**64** Nuts and/or bolts
**70** Wedging element
**72** Cross-member
**74** Cross-member
**76**A Flange
**76**B Flange
**77**A Through-bore
**77**B Through-bore
**78**A Flange
**78**B Flange
**79**A Through-bore
**79**B Through-bore
**80** Surface
**81** Cutout
**82** Surface
**82** Cutout
**84** Surface
**90** Roller or axel
**92** Roller or axel
**94** Retaining element or retaining ring
**100** Locking mechanism
**110** Wireless transmission device or transponder or transmitter or transmission device
**120** Printing device
**122** Feeder module
**130** Print engine tower
**132** Image transfer device
**134** Transfer belt
**136** Ink dispensers
**140** Fuser module
**142** Fuser
**150** Output module
**152** Stacker
**160** Finishing or post-process module
**170** Wedging element
**270** Wedging element
D**1** Direction
D**2** Direction

D3 Direction
D4 Direction
L1 Length
L2 Length
LE Leading edge
R Radius
TE Trailing edge
α Angle
β Angle

What is claimed is:

1. An adjustable leveling assembly for engaging a stack of a plurality of sheets in a tray of a printing device, comprising:
- a body including:
  - a top surface;
  - a bottom surface operatively arranged to engage the tray;
  - a first side wall extending from the top surface to the bottom surface; and
  - a second side wall extending from the top surface to the bottom surface, the second side wall being spaced apart from the first side wall;
- a first wedging element including:
  - a first cross-member engaged with the first side wall and the second side wall;
  - a second cross-member engaged with the first side wall and the second side wall, the second cross-member spaced apart from the first cross-member; and,
  - at least one surface that extends between the first cross-member and the second cross-member;
- wherein, the first wedging element is slidably received within the body and operatively arranged to engage the stack;
- wherein, when the first wedging element is disengaged with the stack, a top sheet of the plurality of sheets is non-parallel to the tray; and,
- when the first wedging element is engaged with the stack, the top sheet is substantially parallel to the tray.

2. The adjustable leveling assembly as recited in claim 1, wherein the at least one surface comprises:
- a first surface extending from the first cross-member;
- a second surface extending from the second cross-member; and,
- a third surface connecting the first surface and the second surface.

3. The adjustable leveling assembly as recited in claim 2, wherein:
- the first surface and the second surface are planar; and,
- the third surface is curvilinear.

4. The adjustable leveling assembly as recited in claim 2, further comprising a cutout arranged in at least one of the first surface and the second surface.

5. The adjustable leveling assembly as recited in claim 1, wherein:
- the first cross-member and the second cross-member are arranged below the top surface; and,
- the at least one surface is arranged above the top surface.

6. The adjustable leveling assembly as recited in claim 5, wherein the top surface comprises an aperture and the at least one surface extends through the aperture.

7. The adjustable leveling assembly as recited in claim 1, further comprising a first pair of tracks, wherein the first wedging element is engaged with the first pair of tracks via at least one roller.

8. The adjustable leveling assembly as recited in claim 7, further comprising a second pair of tracks spaced apart from the first pair of tracks and a second wedging element, wherein the second wedging element is engaged with the second pair of tracks.

9. The adjustable leveling assembly as recited in claim 7, wherein each track of the first pair of tracks comprises a channel and at least one space.

10. The adjustable leveling assembly as recited in claim 9, further comprising at least one plate operatively arranged to be removably engaged with the at least one space.

11. The adjustable leveling assembly as recited in claim 1, further comprising a locking mechanism operatively arranged to fixedly secure the first wedging element with respect to the tray.

12. The adjustable leveling assembly as recited in claim 1, further comprising a transmission device operatively arranged to transmit data to a remote location.

13. The adjustable leveling assembly as recited in claim 1, wherein the first wedging element is slidably displaceable relative to the tray in a direction perpendicular to sheet feeding.

14. An adjustable leveling assembly for engaging an unlevel stack of a plurality of sheets in a tray of a printing device, comprising:
- a body, including:
  - a top surface comprising an aperture;
  - a bottom surface operatively arranged to engage the tray;
  - a first side wall extending from the top surface to the bottom surface;
  - a second side wall extending from the top surface to the bottom surface and spaced apart from the first side wall; and,
- a first wedging element slidably received in the body and having a portion thereof that extends through the aperture;
- wherein the first wedging element comprises:
  - a first cross-member engaged with the first side wall and the second side wall;
  - a second cross-member engaged with the first side wall and the second side wall; and,
  - at least one surface that extends between the first cross-member and the second cross-member;
- wherein, the first wedging element is operatively arranged to engage the unlevel stack to form a level stack.

15. The adjustable leveling assembly as recited in claim 14, further comprising:
- a first channel connected to the first side wall; and,
- a second channel connected to the second side wall;
- wherein the first wedging element is engaged with the first channel and the second channel via at least one roller.

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