

Figure 1

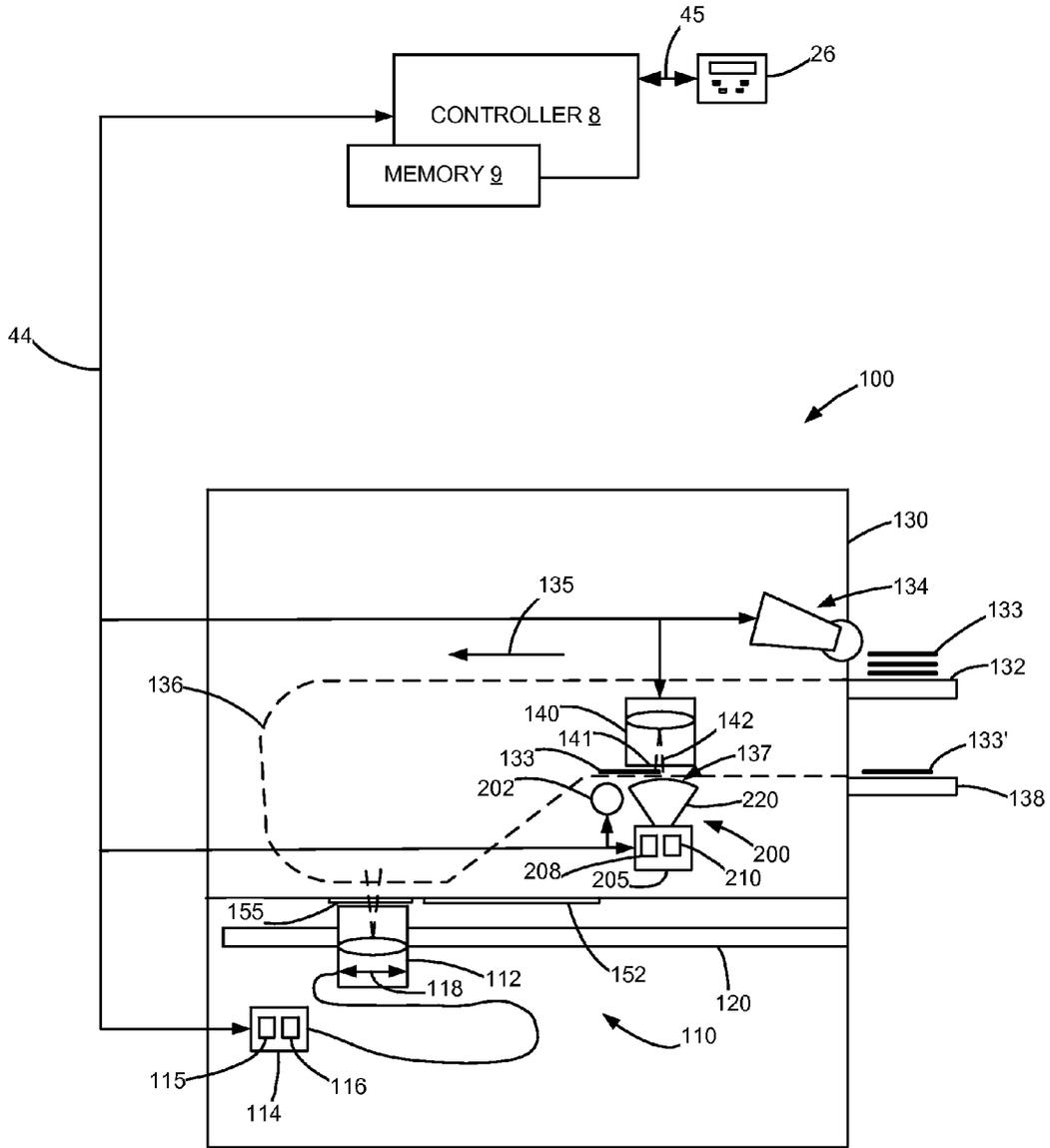


Figure 2



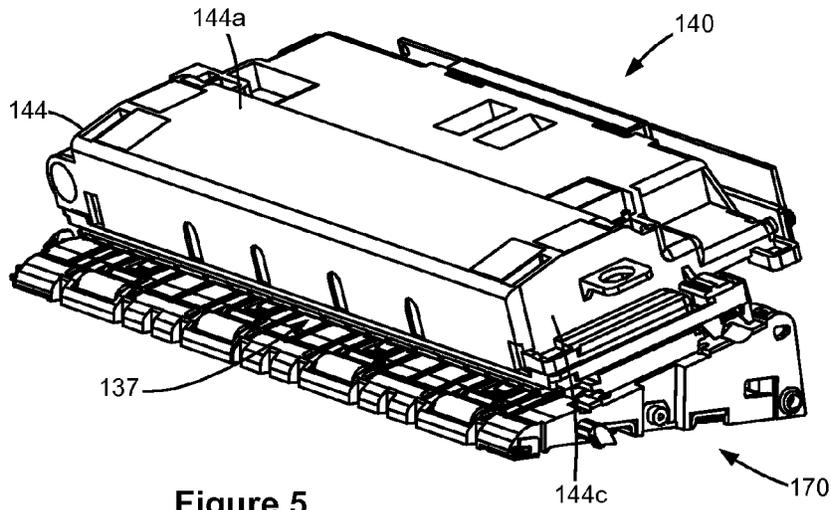


Figure 5

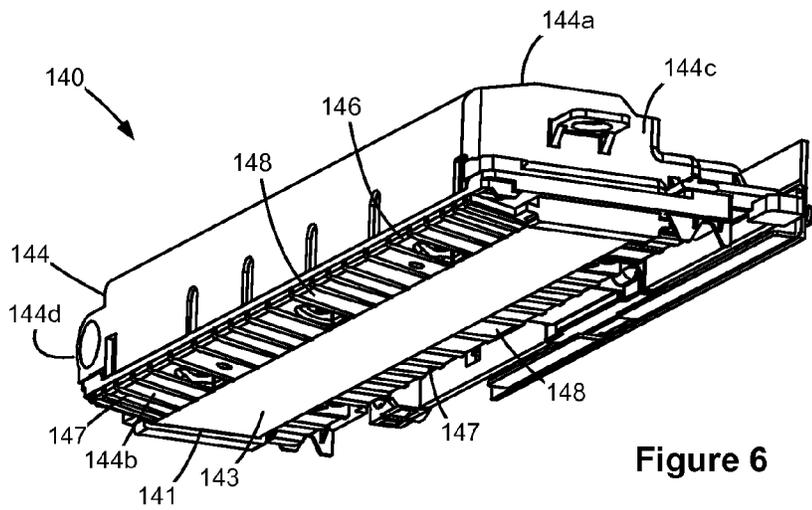


Figure 6

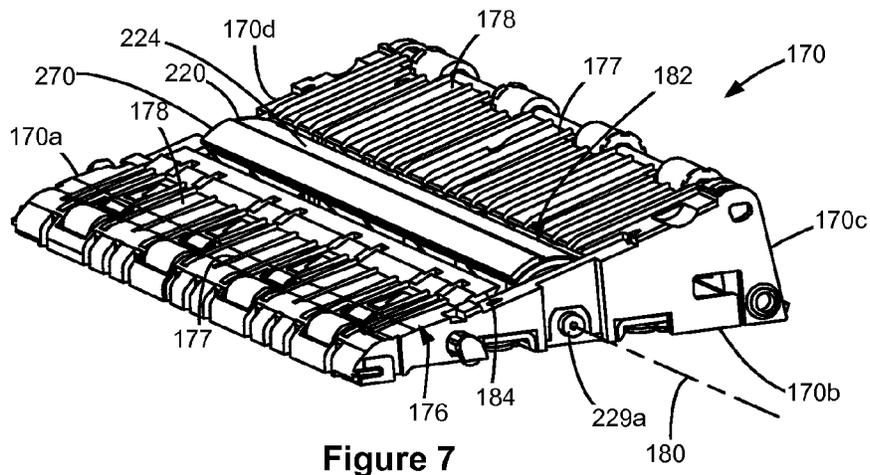


Figure 7

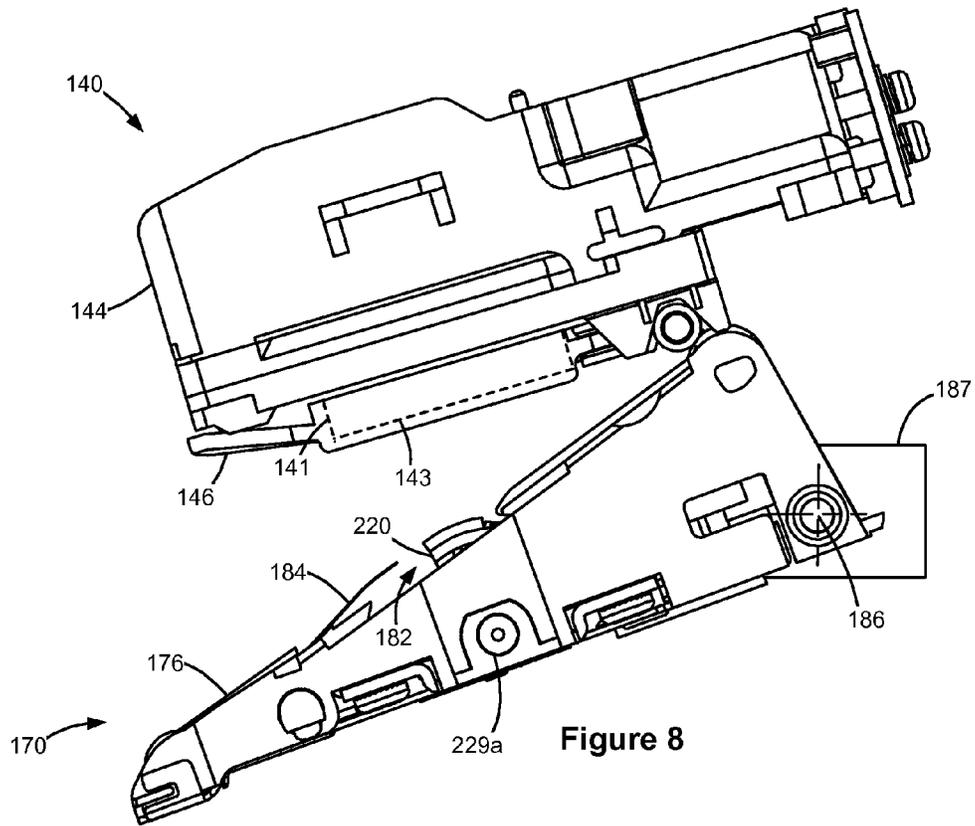


Figure 8

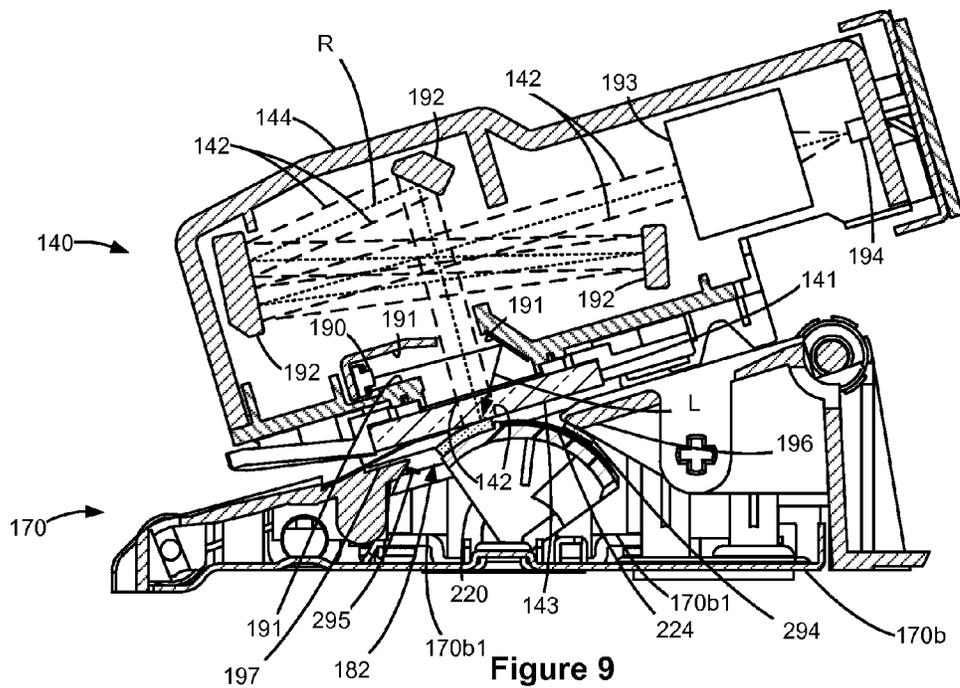


Figure 9

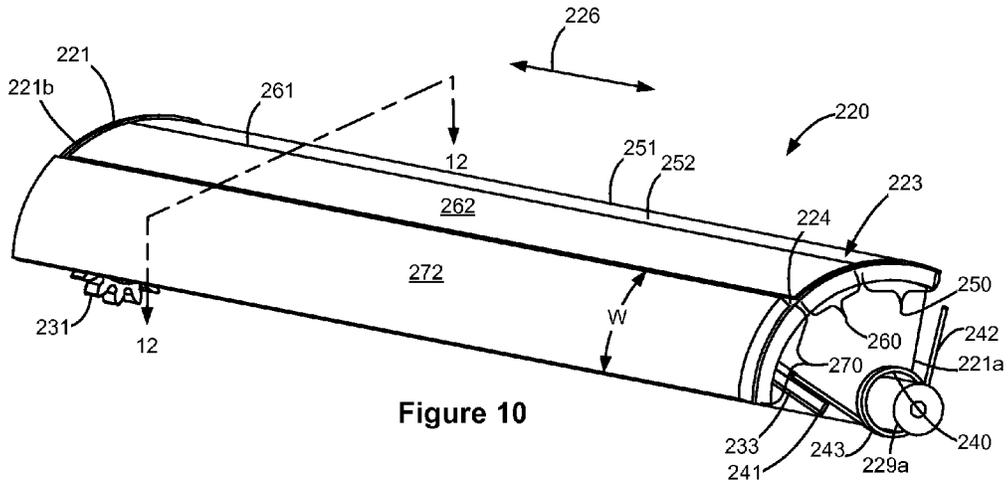


Figure 10

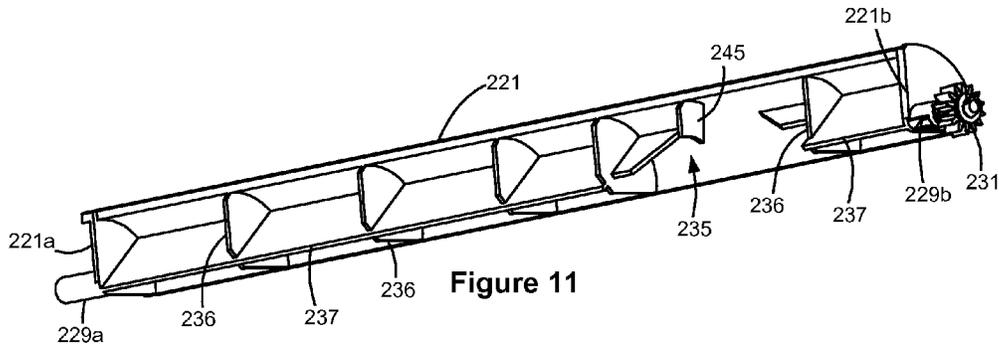


Figure 11

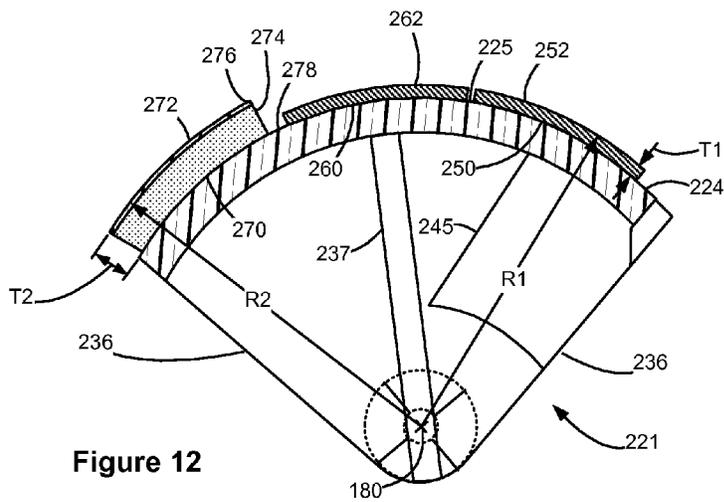


Figure 12

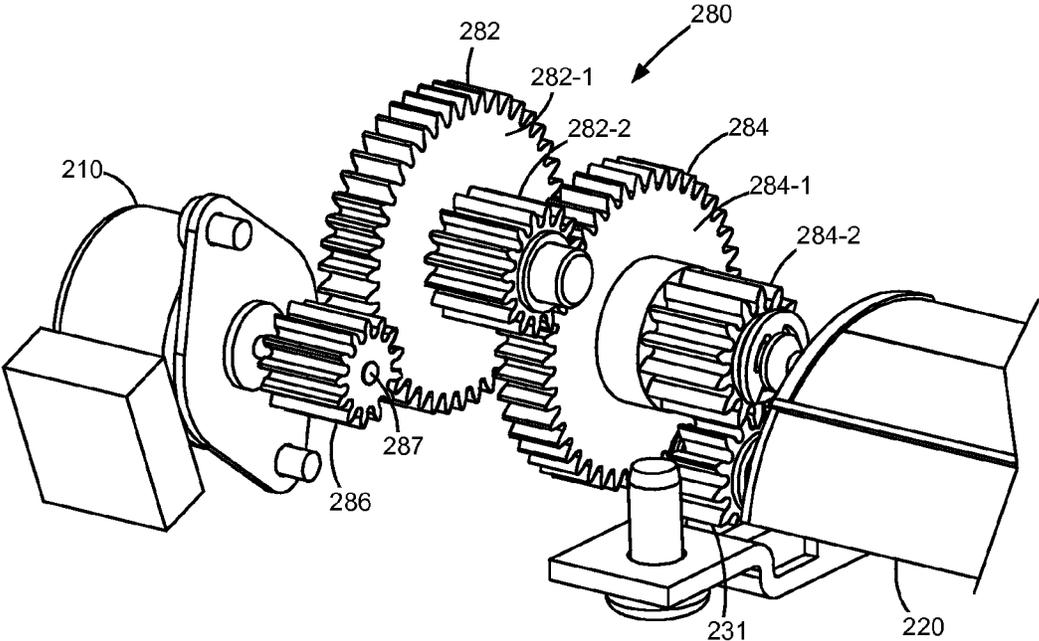


Figure 13

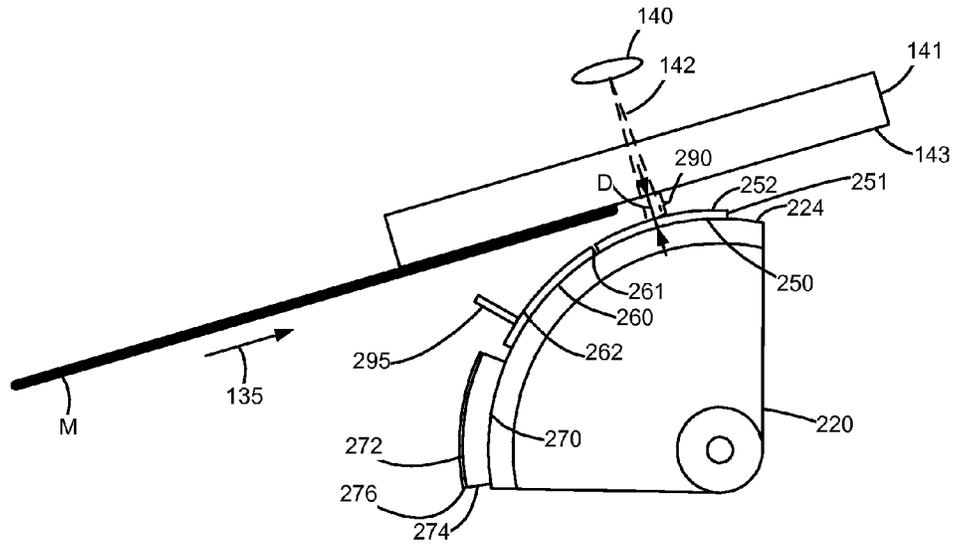


Figure 14A

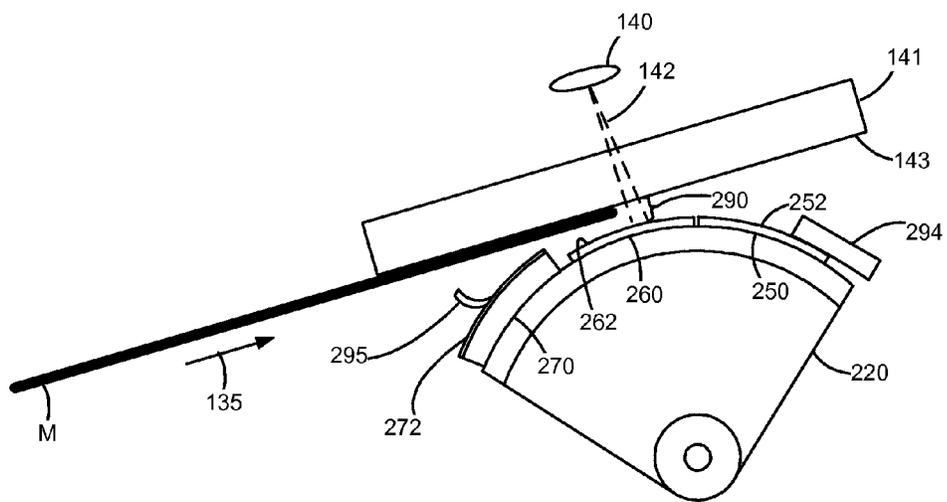


Figure 14B

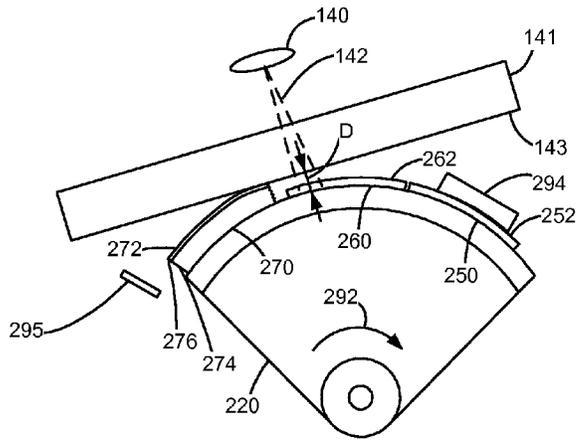


Figure 14C

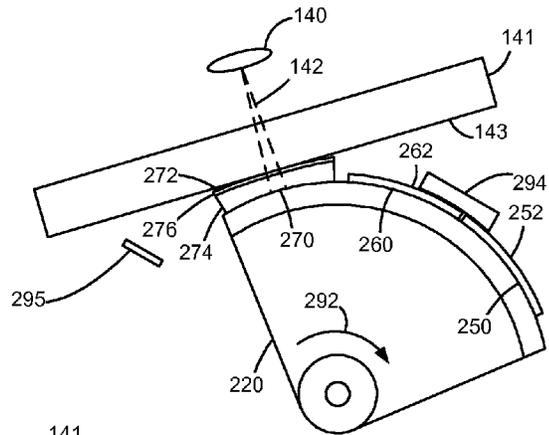


Figure 14D

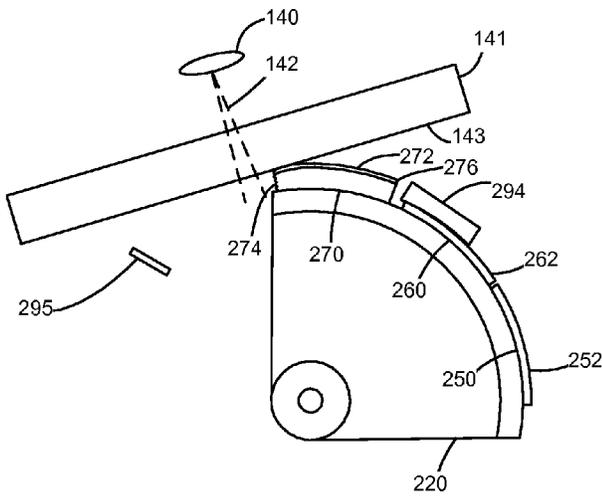


Figure 14E

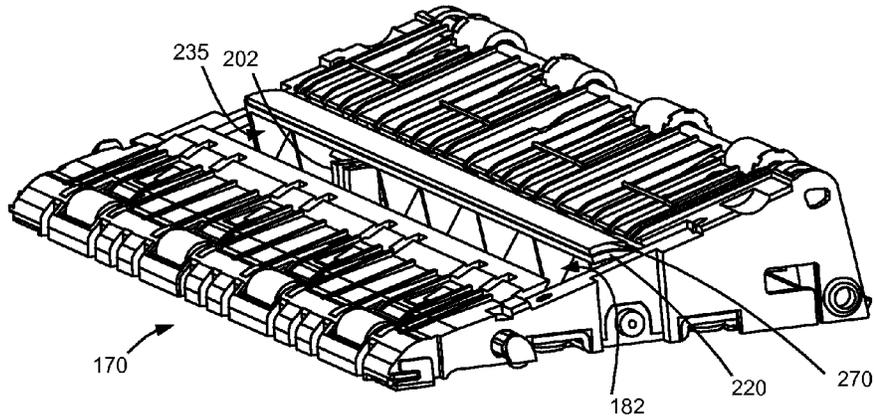


Figure 15

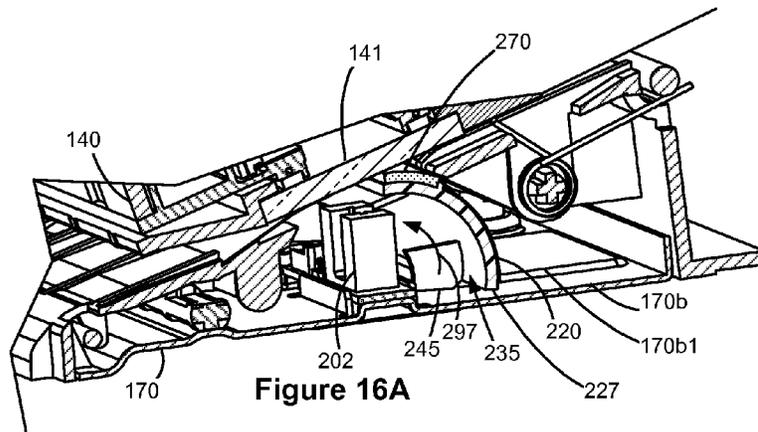


Figure 16A

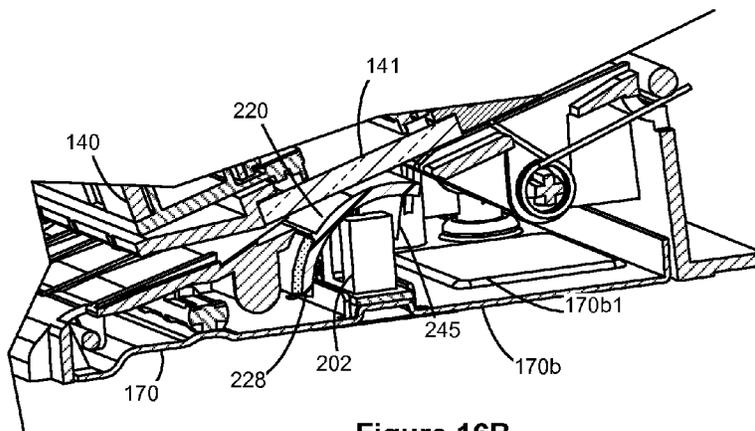


Figure 16B

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**SYSTEM FOR CALIBRATING A  
STATIONARY IMAGE CAPTURE MODULE  
OF AN OPTICAL SCANNER**

CROSS REFERENCES TO RELATED  
APPLICATIONS

None.

STATEMENT REGARDING FEDERALLY  
SPONSORED RESEARCH OR DEVELOPMENT

None.

REFERENCE TO SEQUENTIAL LISTING, ETC.

None.

BACKGROUND

1. Field of the Disclosure

The present disclosure relates generally to a duplexing optical scanner having an automatic document feeder (ADF), and, in particular, to a system for calibrating a stationary image capture module in the ADF.

2. Description of the Related Art

An imaging apparatus, such as a copier, scanner, or a multi-function printing device may include a scanning mechanism that operates in an ADF mode and/or a manual mode. In the manual mode, a media sheet is placed on a flatbed for scanning while in the ADF mode, media sheets are sequentially fed for scanning. In some scanning mechanisms, a duplex automatic document feeder (DADF) is employed whereby two scan modules scan both sides of a media sheet as the media sheet is fed in the ADF.

For a DADF to properly scan images, the two scan modules need to be calibrated. Typically, one of these scanning modules is located in a flatbed scanner and scans one side of a media sheet, and the other is a stationary scanner located inside of the DADF and scans the opposite side of the media sheet. A calibration target used for calibrating the scan module within the flatbed scanner is disposed therein such that contamination of the calibration target with dust is prevented or at least reduced. During calibration a scan is made of white calibration target image and typically has a green hue because the green channel on the scan module, such as a CCD scan module, has the highest sensitivity. Also the light source, reflectors, mirrors, etc., can all contribute to the colors being out of balance resulting in white not appearing to be white. In such a situation the output signals of the three uncalibrated channels, red, blue and green with the CCD scan module looking at a white calibration target would be two or more distinct bands. Calibration will adjust the three color channels with the analog front end (AFE) gain and offset settings to balance the three colors and make the target appear white. The AFE gain setting acts as a multiplier on the signal while the AFE offset acts as an addition or subtraction to move the signal up or down. A dark calibration is also done where the light source is turned off to provide a black target. Largely because of thermal drift, the light source and electronics aging, this calibration is checked and updated every so often. After calibration and adjustment of the AFE gain and offset, the output signals of the three color channels will substantially overlap one another.

Another part of scan module calibration is called shading. While the AFE gain and offset settings act on the entire color channel, shading will act on individual pixels. Shading will

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take each pixel and adjust it to a target. The ideal end result would be a perfectly flat signal output. There are several phenomena shading attempts to compensate for: 1) in the same CCD color channel, there will be a pixel to pixel variation in light sensitivity; 2) the edges of a scan are darker due to the vignetting effect of the lens; 3) any contamination in the optical path can partially block the light from reaching a pixel; and, 4) variation in light output across the scan line. The light source is typically a string of LEDs, and each individual LED's light output will not perfectly match the others. Shading requires a perfect calibration target in order to work properly. Any dust or scratch on the calibration target will cause those pixels to be overcorrected and a vertical band will show up on the scan of a document. In the flatbed scanner this is easy to solve with a moving scan which can be used to filter defects on the calibration target. In the ADF the CCD scan module is stationary, so no compensation is available for any defect on the target.

A calibration target for calibrating the DADF scan module is more susceptible to contaminants because it is typically located along the media path of the ADF, and, thus exposed to contamination such as from media sheets being fed through the media path. For a calibration process to be robust against dust and contamination on the calibration target, a wide area of the calibration target may need to be scanned. Any contamination on the calibration target may then be removed with a filter or averaged with other scan lines of correct data. In the flatbed scanner, this can be accomplished because the flatbed scan module is designed to translate. That is, while the flatbed scanner calibration target is stationary, the flatbed scan module can be moved to scan multiple locations on the flatbed scanner calibration target. In the DADF, however, it is generally difficult to move the DADF scan module to scan multiple locations on the calibration target because of space constraints. In some existing DADFs, stationary calibration targets are used for calibrating the DADF scan module where it scans only one unique location on the calibration target. This calibration process is susceptible to contamination and debris.

Accordingly, there is a need for an improved system for calibrating a scan module in a DADF that is more robust to dust and contamination.

SUMMARY OF THE INVENTION

Disclosed is a calibration member for use with an automatic document feed (ADF) scanner in calibrating a stationary image capture module thereof having an imaging surface against which a surface of a fed media sheet is scanned. The calibration member comprises a body rotatably mountable about a pivot axis in the ADF scanner opposite the imaging surface. The body has an arcuate outer surface and a length substantially spanning a length of the imaging surface. A first background strip of a first thickness is disposed on and extends along a first longitudinal portion of the outer surface of the body and has a top surface having a first reflectivity. A second background strip is disposed on and extends along a second longitudinal portion of the outer surface of the body. The second background strip has a second thickness that is greater than the first thickness of the first background strip and a top surface that is higher than a top surface of the first background strip and which has a second reflectivity that is different from the first reflectivity. When the calibration member is mounted within the ADF scanner at the position opposite the imaging surface, the top surface of the second background strip wipes the imaging surface when the body is rotated about the pivot axis during positioning of the second

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background strip within a field of view of the image capture module during a calibration operation thereof.

In another example embodiment, a calibration unit for calibrating a stationary image capture module of an automatic document feed (ADF) scanner includes a frame member positioned to extend substantially parallel to an imaging surface of the image capture module and is rotatable about a pivot axis. The frame member has an outer side that is rotatably moveable across and adjacent to the imaging surface upon rotating the frame member about the pivot axis. A compliant layer is attached to and extends along a longitudinal portion of the outer side of the frame member. A calibration strip extends along the longitudinal portion of the outer side of the frame and is attached over the compliant layer and has a top surface having a first reflectivity. The compliant layer and the calibration strip have a stack thickness that is greater than a closest distance between the imaging surface and the outer side of the frame member such that a top surface of the calibration strip wipes across the imaging surface when the frame member is rotated to move the calibration strip in a field of view of the image capture module during a calibration process.

In another example embodiment, a system for calibrating the image capture module includes a rotatable frame disposed on a position opposite to the imaging surface, an image backer formed on a first longitudinal portion of the frame, and a calibration surface portion formed on a second longitudinal portion of the frame. The image backer and calibration surface portion are substantially parallel to the imaging surface. The image backer has a top surface having a first reflectivity and that does not contact the imaging surface when the frame is rotated to position the image backer in the field of view of the image capture module. The calibration surface portion has a top surface having a second reflectivity that differs from the first reflectivity and that contacts the imaging surface when the frame is rotated to position the calibration surface portion in the field of view of the image capture module. The system further includes a drive mechanism coupled to the frame for rotating the frame, and a controller in operable communication with the drive mechanism. The controller is configured for controlling the drive mechanism to rotate the frame and selectively position the image backer in the field of view of the image capture module during an image capture operation, and the calibration surface portion in the field of view of the image capture module during calibration of the image capture module.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The above-mentioned and other features and advantages of this invention, and the manner of attaining them, will become more apparent and the invention will be better understood by reference to the following description of embodiments of the invention taken in conjunction with the accompanying drawings.

FIG. 1 is a diagrammatic depiction of an imaging system according to one example embodiment.

FIG. 2 is a schematic diagram of a scanner system of the imaging system in FIG. 1 according to one example embodiment.

FIG. 3 is a perspective view of the scanner system according to one example embodiment.

FIG. 4 is a front elevation view of the scanner system showing internal components thereof according to one example embodiment.

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FIG. 5 is a perspective view of an ADF scan module and a lower guide assembly according to one example embodiment.

FIG. 6 is a perspective view of the ADF scan module showing a bottom thereof.

FIG. 7 is a perspective view of the lower guide assembly including a calibration member according to one example embodiment.

FIG. 8 is a side view of the lower guide assembly in an open position relative to the ADF scan module according to one example embodiment.

FIG. 9 is a sectional view of the ADF scan module and the lower guide assembly according to one example embodiment.

FIG. 10 is a front perspective view of the calibration member according to one example embodiment.

FIG. 11 is a perspective view of the calibration member showing a bottom side thereof according to one example embodiment.

FIG. 12 is a cross-sectional view of the calibration member taken along section line 12-12 in FIG. 10, according to one example embodiment.

FIG. 13 is a perspective view illustrating the calibration member operatively coupled to a drive motor according to one example embodiment.

FIG. 14A illustrates a non-calibration position of the calibration member whereby a first image backer is positioned within a field of view of the ADF scan module, according to one example embodiment.

FIG. 14B illustrates a non-calibration position of the calibration member whereby a second image backer is positioned within the field of view of the ADF scan module, according to one example embodiment.

FIGS. 14C-14E illustrate various positions of the calibration member contacting an imaging surface of the ADF scan module.

FIG. 15 is a perspective view of the lower guide assembly with the calibration member rotated to expose a position sensor, according to one example embodiment.

FIGS. 16A-16B illustrate the position sensor of FIG. 15 being unblocked and blocked by a flag on an inner side of the calibration member, respectively, according to an example embodiment of the present disclosure.

#### DETAILED DESCRIPTION

It is to be understood that the present disclosure is not limited in its application to the details of construction and the arrangement of components set forth in the following description or illustrated in the drawings. The present disclosure is capable of other embodiments and of being practiced or of being carried out in various ways. Also, it is to be understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting. 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 use of "including", "comprising," or "having" and variations thereof herein is meant to encompass the items listed thereafter and equivalents thereof as well as additional items.

Unless limited otherwise, the terms "connected," "coupled," and "mounted," and variations thereof herein are used broadly and encompass direct and indirect connections, couplings, and mountings. In addition, the terms "connected"

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and “coupled” and variations thereof are not restricted to physical or mechanical connections or couplings. Spatially relative terms such as “top”, “bottom”, “front”, “back”, “rear”, “side”, “under”, “below”, “lower”, “over”, “upper”, “up”, “down”, 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.

In addition, it should be understood that embodiments of the present disclosure include both hardware and electronic components or modules that, for purposes of discussion, may be illustrated and described as if the majority of the components were implemented solely in hardware. However, one of ordinary skill in the art, and based on a reading of this detailed description, would recognize that, in at least one embodiment, the electronic based aspects of the invention may be implemented in software. As such, it should be noted that a plurality of hardware and software-based devices, as well as a plurality of different structural components may be utilized to implement the invention. Furthermore, and as described in subsequent paragraphs, the specific mechanical configurations illustrated in the drawings are intended to exemplify embodiments of the present disclosure and that other alternative mechanical configurations are possible.

As used herein, the term “communication link” is used to generally refer to structure that facilitates electronic communication between multiple components, and may operate using wired or wireless technology. While several communication links are shown, it is understood that a single communication link may serve the same functions as the multiple communication links that are illustrated. “Media process direction” describes the movement of media within the imaging system as is generally meant to be from an input toward an output of the imaging system 1. The explanations of these terms along with the use of the terms “top”, “bottom”, “front”, “rear”, “left”, “right”, “up”, and “down”, etc. are made to aid in understanding the spatial relationship of the various components and are not intended to be limiting.

In FIG. 1, there is shown a diagrammatic depiction of an imaging system 1 embodying the present disclosure. As shown, imaging system 1 includes an imaging apparatus 2 and a computer 4. Imaging apparatus 2 communicates with computer 4 via a communication link 6. In the embodiment, imaging apparatus 2 is shown as a multifunction machine that includes a controller 8, a print engine 20, a laser scan unit (LSU) 21, an imaging unit 22, a developer unit 24, a toner cartridge 25, a user interface 26, a media feed system 28 and a media input tray 29, and a scanner system 100. Imaging apparatus 2 may communicate with computer 4 via a standard communication protocol, such as for example, universal serial bus (USB), Ethernet or IEEE 802.xx. A multi-function machine is also sometimes referred to in the art as an all-in-one (AIO) unit. Those skilled in the art will recognize that imaging apparatus 2 may be, for example, an electrophotographic printer/copier including an integrated scanner system 100 or a standalone scanner system 100.

Controller 8 includes a processor unit and associated memory 9, and may be implemented as one or more Application Specific Integrated Circuits (ASICs). Memory 9 may be any volatile and/or non-volatile memory such as, for example, random access memory (RAM), read only memory (ROM), flash memory and/or non-volatile RAM (NVRAM).

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Alternatively, memory 9 may be in the form of a separate electronic memory (e.g., RAM, ROM, and/or NVRAM), a hard drive, a CD or DVD drive, or any memory device convenient for use with controller 8. Controller 8 may be, for example, a combined printer and scanner controller.

In the present embodiment, controller 8 communicates with print engine 20 via a communication link 40. Controller 8 communicates with imaging unit 22 and processing circuitry 34 therein via a communication link 41. Controller 8 communicates with toner cartridge 25 and processing circuitry 35 therein via a communication link 42. Controller 8 communicates with media feed system 28 via a communication link 43. Controller 8 communicates with scanner system 100 via a communication link 44. User interface 26 is communicatively coupled to controller 8 via a communication link 45. Processing circuits 34, 35 may provide authentication functions, safety and operational interlocks, operating parameters and usage information related to imaging unit 22 and toner cartridge 25, respectively. Controller 8 serves to process print data and to operate print engine 20 during printing, as well as to operate scanner system 100 and process data obtained via scanner system 100.

Computer 4, which may be optional, may be, for example, a personal computer, electronic tablet, smartphone or other hand-held electronic device, including memory 50, such as volatile and/or non-volatile memory, an input device 52, such as a keyboard or keypad, and a display monitor 54. Computer 4 further includes a processor, input/output (I/O) interfaces, and may include at least one mass data storage device, such as a hard drive, a CD-ROM and/or a DVD unit (not shown).

Computer 4 includes in its memory a software program including program instructions that function as an imaging driver 56, e.g., printer/scanner driver software, for imaging apparatus 2. Imaging driver 56 is in communication with controller 8 of imaging apparatus 2 via communication link 6. Imaging driver 56 facilitates communication between imaging apparatus 2 and computer 4. One aspect of imaging driver 56 may be, for example, to provide formatted print data to imaging apparatus 2, and more particularly, to print engine 20, to print an image. Another aspect of imaging driver 56 may be, for example, to facilitate collection of scanned data.

In some circumstances, it may be desirable to operate imaging apparatus 2 in a standalone mode. In the standalone mode, imaging apparatus 2 is capable of functioning without computer 4. Accordingly, all or a portion of imaging driver 56, or a similar driver, may be located in controller 8 and or memory 9 of imaging apparatus 2 so as to accommodate printing and scanning functionality when operating in the standalone mode.

Print engine 20 may include laser scan unit (LSU) 21, imaging unit 22, and a fuser 27, all mounted within imaging apparatus 2. The imaging unit 22 further includes a cleaner unit 23 housing a waste toner removal system and a photoconductive drum and developer unit 24 which is removably mounted within print engine 20 of imaging apparatus 2. In one embodiment, the cleaner unit 23 and developer unit 24 are assembled together and installed onto a frame of the imaging unit 22. The toner cartridge 25 is then installed on or in proximity with the frame in a mating relation with the developer unit 24.

Laser scan unit 21 creates a latent image on the photoconductive drum in the cleaner unit 23. The developer unit 24 has a toner chamber or sump containing toner which is transferred to the latent image on the photoconductive drum to create a toned image. The toned image is subsequently transferred to a media sheet received in the imaging unit 22 via media feed system 28 from media input tray 29. Toner rem-

nants are removed from the photoconductive drum by the waste toner removal system. The toner image is bonded to the media sheet in the fuser 27 and the media sheet is sent to an output location or to one or more finishing options such as a duplexer, a stapler or a hole punch (not shown).

Referring to FIG. 2, there is illustrated a schematic representation of scanner system 100. Scanner system 100 includes a flatbed scanner 110 and an automatic document feeder (ADF) 130. Flatbed scanner 110 includes a flatbed image capture or scan module 112 operatively coupled to a drive mechanism 114. Drive mechanism 114 includes one or more gear and/or belt mechanisms 115 and a flatbed drive motor 116. Drive mechanism 114 is in operable communication with controller 8 via communication link 44 and is used to translate flatbed scan module 112 bi-directionally, as indicated by an arrow 118, along a pair of spaced parallel rails 120. ADF 130 includes an input media area 132, a pick mechanism 134, a media path 136, an ADF stationary image capture module or scan module 140, and an output media area 138. Image capture module 140 is termed "stationary" in that during scanning the image capture module 140 does not move and is not translateable like image capture module 112. Original media sheets 133 to be scanned are placed in input media area 132. Pick mechanism 134 is in operable communication via communication link 44 with controller 8 and is used to feed each media sheet 133 placed on input media area 132 one at a time into media path 136 along a media feed direction 135 for scanning within ADF 130 by stationary image capture module 140 through imaging window 141 and by flatbed scanner 110 through imaging window 155. Scanned media sheets 133' are then fed to and are collected in output media area 138.

ADF 130 includes a calibration system 200 for calibrating ADF stationary scan module 140. Calibration system 200 includes a position sensor 202, a drive mechanism 205, and a calibration member 220. Calibration member 220 is positioned about a media path portion 137 opposite ADF stationary scan module 140. Position sensor 202 and drive mechanism 205 are in operable communication with controller 8 via communication link 44. Drive mechanism 205 includes one or more gear mechanisms 208 and a drive motor 210, and is used to drive calibration member 220 to rotate at least between a calibration position and a non-calibration or scanning position. In the calibration position, a top surface of a calibration strip of a known reflectivity and that is positioned on a longitudinal portion of calibration member 220 contacts an imaging surface of ADF scan module 140. In the non-calibration or scanning position, a second strip is mounted on another longitudinal portion of calibration member 220 but is spaced apart from the imaging surface of image capture module 140 forming a gap therebetween and provides a background surface area or image backer for the media sheet positioned in the gap during a scanning operation, as will be explained in greater detail below. Position sensor 202 is used to provide a signal representative of the rotational position of calibration member 220 relative to a field of view 142 of ADF scan module 140.

Each of the flatbed and ADF scan modules 112, 140 generally includes a light source for illuminating a surface of a media sheet to be scanned, and a photoreceptor array for receiving light reflected from the illuminated surface. In one example embodiment, each of flatbed scanner and ADF scan modules 112, 140 may comprise a charge-coupled device (CCD) module, a contact image sensor (CIS) scan bar, or an optical reduction scan bar. Flatbed and ADF scan modules 112, 140 do not have to be of the same type.

FIG. 3 is a perspective view of scanner system 100 and FIG. 4 illustrates internal components thereof. Scanner system 100 includes a base 150 and a scan lid 160. Base 150 houses flatbed scanner 110 and includes a platen 152 incorporated into an upper surface 153 thereof. Platen 152 is transparent and holds a media sheet having an image to be scanned. Within base 150 are flatbed scan module 112 and drive mechanism 114 used to translate flatbed scan module 112 on rails 120 mounted in base 150 beneath platen 152 along the length of platen 152 when scanning an image placed on platen 152. Flatbed scan module 112 is generally used to illuminate and scan a bottom surface of an original. As used herein, "bottom surface" refers to that surface of the original being scanned that is in contact with the upper surface of platen 152. Flatbed scan module 112 may also be held in a stationary position, a position upstream of ADF scan module 112 as shown, and used to scan the bottom surface of the original as the original is moved past it.

Scan lid 160 includes ADF 130. Scan lid 160 is moveably attached to base 150 and moveable between an open position where scan lid 160 is raised away from platen 152 and a closed position, as shown, where scan lid 160 covers platen 152. An input media support 162 extends from the input end 163 of media path 136 and provides input media area 132 where media having images to be scanned are placed. An output media support 165 extends from the output end 166 of media path 136 and provides output media area 138 for receiving the scanned media sheets. ADF scan module 140 is generally used to illuminate and scan a scan line on an upper surface of an original passing beneath it. As used herein, "upper surface" refers to that surface of the original being scanned that is facing away from platen 152. ADF scan module 140 is positioned above media path portion 137 opposite a lower guide assembly 170. In an example embodiment, lower guide assembly 170 incorporates therein calibration member 220 positioned opposite ADF scan module 140. ADF 130 also includes a spring-biased pressure pad 168 for pressing a portion of the media being scanned against a scan window 155, which is also a transparent window, on the upper surface 153 of base 150 through which flatbed scan module 112 may scan the bottom surface of the original being scanned and being fed through ADF 130. The surface of pressure pad 168 is usually white in color or may be divided into a white portion and a black portion.

Pick mechanism 134 includes a pick roll 139 and is attached to an upper frame section 172 of ADF 130 for picking media sheets disposed on input media area 132. A plurality of feed roll pairs 173, each pair having opposed rolls forming feed nips therebetween, are spaced along media path 136 for conveying media sheets having images to be scanned from input media area 132 to output media area 138. As would be understood by one of ordinary skill in the art, a drive mechanism including one or more gear mechanisms and a motor is used to drive feed roll pairs to advance media sheets along media path 136. ADF 130 further includes a plurality of media sensors positioned to detect presence of media sheets and/or media position as they advance along media path. For example, media sensor 174-1 is positioned adjacent to input end 163 of media path 136 to provide signals to controller 8 indicative of at least one media sheet being disposed in input media area 132. Media sensors 174-2 are positioned downstream of pick roll 139 to detect leading and/or trailing edges of the fed media sheet and provide signals to controller 8 indicative of the position of the media sheet to be scanned along media path 136.

To scan a media sheet in manual mode, scan lid 160 is manually lifted to expose platen 152 and the media sheet to be

scanned is placed on top of platen **152**. Scan lid **160** is then manually closed against base **150**. Under the direction of controller **8**, flatbed scan module **112** moves in a bi-directional scan direction, indicated by arrow **118**, along at least a portion of the length of platen **152**. While moving along rails **120**, flatbed scan module **112** illuminates and scans scan lines on the bottom surface of the original placed on platen **152**. The scan area and scan lines are directed orthogonally into the plane of the page on which FIG. **4** is shown. The scan area is sized to handle various sizes of media such as A4, Letter, Legal or Ledger sized media, or smaller.

To scan one or more originals in ADF mode, calibration member **220** is rotated to a scanning position. One or more sheets of originals is placed in input media area **132** then fed through ADF **130** and past flatbed scan module **112** and then ADF scan module **140** along media path **136**, and out to output media area **138**. For a one-sided or simplex scanning operation, sheets of media are fed through ADF **130** and one of flatbed scan module **112** and ADF scan module **140** is then used to scan the surface of the media containing the image or text, depending on the design of ADF **130**. For duplex scanning, media fed through ADF **130** from input media area **132** pass through both flatbed scan module **112** and ADF scan module **140** where the bottom and top surfaces of the media are scanned thereby, respectively. When flatbed scan module **112** of flatbed scanner **110** is used for scanning media sheets fed through ADF **130** either in simplex mode or duplex mode, flatbed scan module **112** may be moved to a fixed position beneath scan window **155** that is generally upstream of the ADF scan module **140** relative to the media feed direction as illustrated in FIG. **4**. Separation of the two scan modules along the media path **136** is done to reduce light interference between the two scan modules during duplex scanning. Again the scan area and scan lines for ADF image capture module **140** are directed orthogonally into the plane of the page on which FIG. **4** is shown.

FIGS. **5-7** show ADF scan module **140** and lower guide assembly **170** according to one example embodiment. ADF scan module **140** includes a housing **144** having a top **144a**, a bottom **144b**, and sides **144c**, **144d**. Bottom **144b** of housing **144** defines an upper guide surface **146** having a plurality of ribs **147** that are arranged to retain media in alignment during feeding. ADF scan module **140** further includes an imaging window **141** incorporated in bottom **144b** thereof and extending between sides **144c**, **144d**. Imaging window **141** is transparent, and, in one example form, comprises a glass material, and has an outer imaging surface **143** against which an upper surface of a fed original media sheet is scanned.

Lower guide assembly **170** has a top **170a**, bottom **170b**, and sides **170c**, **170d** that surround calibration member **220**. Top **170a** defines a lower guide surface **176** having a plurality of ribs **177** that cooperate with the ribs **147** of upper guide surface **146** to reduce surface contact between the media being scanned and inner surfaces **148**, **178** of the upper and lower guide surfaces **146**, **176**, respectively, during feeding in order to reduce drag and possible media skewing. Calibration member **220** spans imaging window **141**, extends substantially parallel to imaging window **141**, is rotatably mounted using pivot pins **229a**, **229b** (see FIG. **11**) within lower guide assembly **170** to sides **170c**, **170d** thereof, and is rotatable about a pivot axis **180**. An aperture **182** is provided on top **170a** of lower guide assembly **170** opposite imaging window **141** to provide a window for exposing the outer surface **224** of calibration member **220**. In FIG. **5**, ADF scan module **140** is shown positioned above lower guide assembly **170** such that upper guide surface **146** and lower guide surface **176** are separated from each other to provide media path portion **137**

therebetween, and imaging window **141** and calibration member **220** are positioned opposite relative to each other. The gap between upper guide surface **146** and lower guide surface **176** may be selected to allow passage of different types and thicknesses of media sheets. A media deflector **184** is positioned on top **170a** of lower guide assembly **170** upstream of aperture **182** to direct fed media sheets relatively close to or against imaging surface **143** when passing through media path portion **137**.

In one example embodiment, lower guide assembly **170** may be configured as a jam door which generally provides access to media path portion **137** for clearing media jams therein. For example, with reference to FIG. **8**, lower guide assembly **170** is pivotally connected at a pivot **186** to a peripheral frame **187** of scan lid **160** in order to allow lower guide assembly **170** to be rotatable between a closed position, in which lower guide assembly **170** covers upper guide surface **146** and imaging window **141**, and an open position shown in which upper guide surface **146** and imaging window **141** are uncovered and exposed, as shown in FIG. **8**. A spring mechanism (not shown) may be utilized to continuously bias lower guide assembly **170** towards its closed position. Alternatively, lower guide assembly **170** may be snap fit into its closed position using any form of latch/release mechanisms as are known in the art.

FIG. **9** illustrates internal components of ADF scan module **140** and lower guide assembly **170** with lower guide assembly shown in its closed position. In the example shown, housing **144** of ADF scan module **140** incorporates a light source **190**, reflective surfaces **191**, mirrors **192**, a lens **193**, and a sensor module **194**. Reflective surfaces **191** direct light L, indicated by the solid line, from light source **190** through imaging window **141** to scan a surface of an original media sheet that is in front of or held against imaging surface **143** of imaging window **141**, and light reflected therefrom, R, indicated by the small dashed line, is reflected by mirrors **192** towards lens **193**. Lens **193** focuses the reflected light R onto sensor module **194**, which, in turn, converts the received focused light into a digital image corresponding to an optical image of the scanned surface or an original media sheet. In one example embodiment, ADF scan module **140** has a focal distance corresponding to the imaging surface **143** of imaging window **141** and has field of view **142**, depicted by large dashed lines **142** at imaging surface **143**. Calibration member **220** rotatably mounted in lower guide assembly **170** is shown positioned within field of view **142**. Portions of the outer surface **224** of calibration member **220** may partially extend out of aperture **182** and are positionable within the field of view **142** of ADF scan module **140** when calibration member **220** is rotated about pivot axis **180**.

FIGS. **10-12** show calibration member **220** according to one example embodiment. Calibration member **220** includes an elongated frame or body **221**. Body **221** has an outer side **223** having a generally arcuate outer surface **224** that extends along a lengthwise dimension **226** between sides **221a**, **221b**. Pivot pins **229a**, **229b** axially extend from respective sides **221a**, **221b** of calibration member **220** and are rotatably mountable on corresponding sides **170c**, **170d** of lower guide assembly **170** along pivot axis **180** (see FIG. **7**). Pivot pin **229b** is coupled with a pinion gear **231** which operatively couples calibration member **220** to drive motor **210** (See FIG. **13**) when lower guide assembly **170** is in the closed position. An inner side **235** of body **221** may include one or more radial support ribs **236**, and one or more axial support ribs **237** for stiffening and strengthening calibration member **220**. In the example shown, an optional torque member **233** protrudes from side **221a** for engaging with a leg **241** of an optional

torsion spring 240 that applies torque to calibration member 220. The other leg 242 of torsion spring 240 is fastened to lower guide assembly 170. The body 243 of spring 240 is mounted about pivot pin 229a. The torque from spring 240 helps calibration member 220 to move smoothly. The center of gravity of illustrated calibration member 220 is offset from pivot axis 180 and the torque from spring 240 smoothes out the motion of calibration member 220 due to backlash inherent in gear train 280 shown in FIG. 13.

The outer side 223 of body 221 is divided into a plurality of longitudinal portions 250, 260, 270 that extend along lengthwise dimension 226, span the length of imaging window 141, and are rotatably moveable across imaging window 141 of ADF scan module 140 when rotating body 221 about pivot axis 180. Each longitudinal portion generally provides a different background area for ADF scan module 140 depending on a rotational position of body 221. In one example embodiment, the plurality of longitudinal portions include a first background portion 250, a second background portion 260 and a calibration surface portion 270 extending substantially parallel relative to each other. The outer surfaces of portions 250, 260, 270 may have different reflectivities. In one example embodiment, first and second background portions 250, 260 and calibration surface portion 270 may each have a width W, such as about 8 mm, and lengths of about 235 mm. However, each of portions 250, 260, 270 may have the same or different widths and the width W should not be considered as a limitation of the design. The width W is chosen so that several scan lines may be generated when a scan is being performed on a given portion. The color of each of portions 250, 260, 270 may be an inherent property of the material used in that portion of body 221 or may be painted onto the respective portion.

In one example form, first background portion 250 comprises a first background strip 251 adhesively attached to outer surface 224 of body 221 and having a top surface 252 having a reflectivity for providing a relatively dark or black background area for ADF scan module 140, and second background portion 260 comprises a second background strip 261 adhesively attached to outer surface 224 of body 221 and having a top surface 262 having a reflectivity that is different from or greater than the reflectivity of the top surface 252 of first background strip 251 for providing a relatively bright or white background area for ADF scan module 140. For example, first background strip 251 may have a black color and second background strip 261 may have a white color. First and second background strips 251, 261 may be made from polyethylene terephthalate (PET). Example dimensions for a black top surface 252 are about 235 mm long and about 9 mm wide and those for a white top surface 262 are about 235 mm long and about 7 mm wide.

First background portion 250 in its various embodiments may be used as a black image backer to more accurately locate top, bottom and side edges or borders of a media sheet being scanned in order to support features such as auto-cropping, electronic deskew, and dynamic margin translation for different scan modes. Second background portion 260 in its various embodiments may be used as a white image backer when scanning media sheets with punched holes and/or folded or damaged corners to prevent such punched, folded, or damaged portions of the media from appearing black on the optical image, as would otherwise happen when a black image backer were used. Conversely, second background portion 260 may be black, and first background portion may be white. In the example shown, a gap 225 (see FIG. 12) may be provided between first and second background portions 250, 260. In an alternative example embodiment, first and

second background portions 250, 260 may abut one another (see FIG. 10). First and second background portions 250, 260 each have a length that longitudinally extends beyond the side edges of the widest media expected to be scanned by ADF scan module 140.

Top surfaces 252, 262 may also be wiped by one or more optional wipers mounted on lower guide assembly 170 adjacent to aperture 182. As shown in FIG. 9, a strip or block wiper 294 made of foam or other similar material is mounted on a support 196 in lower guide assembly 170 while a blade wiper 295 made of rubber or acrylic material is shown mounted on a support 197 in lower guide assembly 170. Both wipers 294, 295 extend the longitudinal length of first or second background portions 250, 260. Regardless of style, wipers 294, 295 are positioned to contact and wipe across top surfaces 252, 262. The style of wiper and its placement in lower guide assembly 170 is a matter of design choice and is not a limitation of the disclosed design.

Calibration surface portion 270 may have a substantially arcuate top surface 272 and may comprise one or more materials that provide properties to allow high reflectance of light and compliance such that its top surface 272 conforms to imaging window 141 when pressed thereagainst. In one example embodiment, calibration surface portion 270 may be provided as a homogeneous layer comprising a compliant strip or layer with the aforementioned characteristics. In another example embodiment, calibration surface portion 270 may be comprised of a plurality of layers. For example, FIG. 12 illustrates a cross-sectional view of calibration member 220 taken along line 12-12 of FIG. 10. As shown, calibration surface portion 270 comprises a compliant layer 274 disposed on the outer surface 224 of body 221, and a calibration strip 276 disposed over compliant layer 274. Compliant layer 274 may be adhesively attached to outer surface 224 and may be made from foam or any suitable resilient material, such as urethane, polyurethane, felt, or other flocculated material. Calibration strip 276 may be adhesively attached over the top of compliant layer 274, may have a top white surface area, may have a high reflectance, and/or may be made of PET material. A junction or transition zone 278 may be provided between calibration surface portion and the adjacent image backer. For example, transition zone 278 may comprise a black gap that longitudinally extends between calibration surface portion 270 and second background portion 260 in order to enable firmware transitions between the calibration surface portion 270 and the other background portions 260, 250 used during document scanning.

According to one example embodiment, first and second background portions 250, 260 have substantially the same thickness T1, and calibration surface portion 270 has a thickness T2 that is greater than the thickness T1 of the first and second background portions 250, 260 such that top surface 272 of calibration surface portion 270 is higher than the top surfaces 252, 262 of first and second background portions 250, 260 relative to the outer surface 224 of body 221. In the embodiment illustrated in FIG. 12, compliant layer 274 and calibration strip 276 may have a stack thickness corresponding to thickness T2 that is greater than a closest distance D (See FIG. 14A) between imaging window 141 and outer surface 224 of body 221 such that the top surface 272 of calibration surface portion 270 can press against and wipe across imaging window 141 when body 221 is rotated to move calibration surface portion 270 into the field of view 142 of ADF scan module 140. First and second background portions 250, 260 each have a thickness T1 that is less than the closest distance D such that their top surfaces 252, 262, do not

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contact imaging window 141 when body 221 is rotated to position first and second background portions 250, 260 into the field of view 142 of ADF scan module 140 and form a gap therebetween through which an original media sheet being scanned passes. In one example embodiment, thickness T2 of calibration surface portion 270 may be greater than about 1 mm, such as about 1.4 mm, and thickness T1 of first and second background portions 250, 260 may be less than about 0.5 mm, such as about 0.25 mm. In another example embodiment, top surfaces 252, 262 of first and second background portions 250, 260 may have a radial distance R1 of about 14 mm from pivot axis 180, and top surface 272 of calibration surface portion 270 may have a radial distance R2 of about 15 mm from pivot axis 180.

Although the illustrated embodiments show three longitudinal portions including first and second background portions 250, 260 and calibration surface portion 270 in a particular arrangement, it will be appreciated that arrangement between such sections can be interchanged. Additionally, it is contemplated that other colors for the background portions may be used, and that more than two background portions having different colors may be disposed on the outer side 223 of body 221. For a non-limiting example, a grey color may be used. Further only a single background portion may be used as an image backer along with calibration surface portion 270.

FIG. 13 illustrates drive motor 210 being operatively coupled to calibration member 220 via a coupling mechanism, generally designated 280. Drive motor 210 is used to rotate calibration member 220 about pivot axis 180. In the example shown, the coupling mechanism 280 includes a gear mechanism or gear train 280 comprising a first compound gear 282 and a second compound gear 284. First and second compound gears 282, 284 each comprises at least two different diameter gears, such as first gears 282-1, 284-1 and second gears 282-2, 284-2, respectively, that are fixedly attached to each other and rotate together at the same direction and speed. First gears 282-1, 284-1 are shown having larger diameters than respective second gears 282-2, 284-2. First gear 282-1 of first compound gear 282 meshes with a pinion gear 286 on shaft 287 of drive motor 210 while second gear 282-2 thereof meshes with first gear 284-1 of second compound gear 284. In an example embodiment, drive motor 210 may comprise a stepper motor. Second gear 284-2 of second compound gear 284 meshes with pinion gear 231 coupled to pivot pin 229 of calibration member 220. In an example embodiment, a gear ratio defined by gear train 280 may be about 8.5:1 such that calibration member 220 rotates at a relatively slower rotational speed than pinion gear 286 of drive motor 210. For example, for a given radial travel arc of about 15 mm of top surface 272 of calibration surface portion 270 and twenty full steps per stepper motor revolution of drive motor 210, travel distance of top surface 272 may be kept under 1 mm per step of motor rotation. It will be appreciated, however, that other gear ratios may be used to achieve different speed ratios for drive motor 210 and calibration member 220 and that non-compound gears may be used. Second gear 284-2 of second compound gear 284 disengages from pinion gear 231 coupled to pivot pin 229 of calibration member 220 when lower guide assembly 170 is rotated to its open position, and reengages with pinion gear 231 when lower guide assembly 170 is rotated to its closed position.

Referring now to FIGS. 14A-14E, different positions of calibration member 220 relative to imaging window 141 and field of view 142 are illustrated. FIGS. 14A-14B correspond to non-calibration or scanning positions whereby calibration member 220 is rotated to position first background portion 250 and second background portion 260 adjacent to but not in

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contact with imaging window 141 to be in the field of view 142 of ADF scan module 140, which is represented by an ellipse in the example illustrations, respectively. As shown, a gap corresponding to closest distance D is provided between outer surface 224 of body 221 and imaging surface 143 of imaging window 141 such that there is a sufficient opening 290 between imaging window 141 and top surfaces 252, 262 of first and second background strips 251, 261 mounted on first and second background portions 250, 260, respectively to allow a media sheet M to pass through and be scanned by ADF scan module 140. In FIG. 14A, wiper blade 295 is shown wiping top surface 262. In FIG. 14B calibration member 220 has been rotated to show that wiper blade 295 is in contact with top surface 272 and wiper pad 294 in contact with top surface 252. Accordingly, in the scanning positions, media path portion 137 is open for media M to pass through. In one example embodiment, one of the first and second background portions 250, 260 (and first and second background strips 251, 252) may be automatically selected based on a scan mode selected by a user. In another example embodiment, one of first and second background portions 250, 260 (or first and second background strips 251, 261) may be manually selected by the user such as by directly interacting with menu items implemented on user interface 26 of imaging apparatus 2.

FIGS. 14C-14E illustrate sequential views of calibration member 220 being rotated in a direction indicated by an arrow 292 to be in the field of view 142 of ADF scan module 140 for a calibration operation. Because thickness T2 of calibration surface portion 270 is greater than gap D, the top surface 272 thereof contacts the imaging surface 143 of imaging window 141 and begins to compress as it initially approaches the field of view 142 of ADF scan module 140, as shown in FIG. 14C. In FIG. 14C, second background portion 260 has been rotated to a new position at which ADF scan module 140 may take a second image of second background portion 260. Controller 8 may be programmed to incrementally move calibration member 220 so that multiple images or multiple scan lines may also be taken of background portions 250 and calibration strip 276 as shown for background portion 260. Controller 8 may be programmed to average the multiple images or multiple scan lines.

As calibration member 220 is further rotated in the direction 292 as shown in FIGS. 14D-14E, portions of the top surface 272 continue to contact and are pressed against imaging surface 143. In the example shown, the compliant layer 274 underneath calibration strip 276 allows for calibration strip 276 to deform or compress as it is pressed against imaging window 141. Accordingly, media path portion 137 is closed off and the top surface 272 of calibration strip 276 wipes across the imaging surface 143 as calibration member 220 is rotated from the position shown in FIG. 14C to the position shown in FIG. 14E, thereby removing dust or contaminants not only on the imaging surface 143 but also contaminants on the top surface 272 of calibration strip 276.

In FIG. 14C calibration member 220 has rotated away from wiper blade 295 and wiper pad 294 has wiped further across top surface 252. In FIG. 14D, calibration member 220 has continued to rotate away from wiper blade 295 and wiper pad 294 is in contact with top surfaces 252, 262. In FIG. 14E wiper pad 294 has wiped completely across top surface 262. Calibration member 220 may be returned to the position shown in any of the prior figures. The action of wipers 294, 295 helps to remove any particles that may have fallen on or otherwise accumulated on any or all of top surfaces 252, 262, 272.

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It should be noted that the example illustrations are provided to facilitate understanding of the invention and that the width of contact between imaging window 141 and calibration strip 276 may be narrower than that depicted in the example illustrations. Calibration strip 276 may have a thickness such that at least a tangential contact occurs between calibration strip 276 and imaging window 141 during calibration. For example, calibration strip 276 may have a top surface that is shaped to establish at least a single line of contact with imaging window 141 as calibration member 220 is rotated to move calibration strip 276 within the field of view 142 of ADF scan module 140.

According to an example embodiment, ADF scan module 140 may be configured to scan a plurality of scan lines while calibration strip 276 is wiped across imaging window 141. That is, while ADF scan module 140 is stationary, calibration strip 276 is rotated to allow ADF scan module 140 to scan multiple locations of calibration strip 276. Thereafter, controller 8 may use the plurality of scan lines to calibrate ADF scan module 140. Because dust or contaminants are removed from the surfaces of calibration strip 276 and imaging window 141 while ADF scan module 140 is acquiring a plurality of scan lines to be used for calibration, a calibration process that is more robust against dust and contamination is provided. In other example embodiments, wiping by calibration member 220 may be done anytime to wipe off contaminants on imaging surface 143. For example, calibration member 220 may be rotated to have calibration strip 276 wipe imaging surface 143 after a predetermined number of media sheets are scanned.

In the above example embodiments, calibration member 220 is housed within lower guide assembly 170 such that calibration member 220 may be decoupled from gear train 280 when lower guide assembly 170 is opened. In order to provide accurate positioning of calibration member 220 after lower guide assembly 170 is closed and calibration member 220 is recoupled to drive motor 210 via second gear 284-2 of second compound gear 284, calibration system 200 may implement a homing sequence. The homing sequence allows for calibration member 220 to be reset to a known initial or starting position upon closing lower guide assembly 170.

With reference to FIG. 15, calibration member 220 has been rotated to a position to expose a position sensor 202 that is positioned within lower guide assembly 170. Location of position sensor 202 corresponds to a location of a flag 245 (see FIG. 11) on the inner side 235 of calibration member 220 so that flag 245 can actuate position sensor 202 as calibration member 220 rotates. In the example shown, position sensor 202 comprises an optical sensor and flag 245 is sized to move into or out of and block or unblock an optical path of position sensor 202. It will be appreciated, however, that any type of sensing mechanism or arrangement may be used.

In one example embodiment, the homing sequence may be implemented by causing flag 245 to always approach position sensor 202 from the same direction in order to achieve consistent homing. For example, FIG. 16A illustrates an initial position of calibration member 220 upon closing lower guide assembly 170 where position sensor 202 is unobstructed by flag 245. A first longitudinal edge 227 of calibration member 220 is shown resting on bottom 170b which acts as a rotational stop when calibration member is rotated in the clockwise direction. In one form a rotational stop may be provided by raised portions 170b1 provided in bottom 170b. Optionally a second longitudinal edge 228 of calibration member 200 may be stopped by raised portion 170b1 shown in FIG. 9 when calibration member 200 is rotated in the counter-clockwise direction.

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During the homing sequence, calibration member 220 is rotated counter-clockwise, as indicated by arrow 297, until flag 245 actuates position sensor 202, as shown in FIG. 16B, which causes an output signal thereof to change from a first state to a second state. If, upon closing lower guide assembly 170, position sensor 202 is initially obstructed by flag 245 (as shown in FIG. 16B), calibration member 220 may be rotated clockwise until the output signal of position sensor 202 changes from the second state to the first state indicating that flag 245 has moved out of and unblocked the optical path of position sensor 202. In one example embodiment, the size of flag 245 may be selected such that flag 245 would continue to block position sensor 202 at the position where the rotational movement of calibration member 220 has been stopped by bottom 170b at second longitudinal edge 228. Thereafter, the system may proceed with the homing sequence whereby calibration member 220 is rotated counter-clockwise until flag 245 actuates position sensor 202. The position at which flag 245 actuates position sensor 202 may be referred to as a home position for calibration member 220, and may be stored as a constant position. Controller 8 may then use the home position as a reference position when rotating calibration member 220 to move and position background portions 250, 260 and calibration surface portion 270 into the field of view 142 of ADF scan module 140.

The foregoing description of several methods and an embodiment of the present disclosure have been presented for purposes of illustration. It is not intended to be exhaustive or to limit the present disclosure to the precise steps and/or forms disclosed, and obviously many modifications and variations are possible in light of the above description. It is intended that the scope of the present disclosure be defined by the claims appended hereto.

What is claimed is:

1. A calibration member for use with an automatic document feed (ADF) scanner in calibrating a stationary image capture module thereof having an imaging surface against which a surface of a fed media sheet is scanned, the calibration member comprising:

a body rotatably mountable about a pivot axis in the ADF scanner opposite the imaging surface, the body having an arcuate outer surface and a length substantially spanning a length of the imaging surface;

a first background strip of a first thickness disposed on and extending along a first longitudinal portion of the outer surface of the body, a top surface of the first background strip having a first reflectivity; and

a second background strip disposed on and extending along a second longitudinal portion of the outer surface of the body, the second background strip having a second thickness that is greater than the first thickness and having a top surface that is higher than the top surface of the first background strip, the top surface of the second background strip having a second reflectivity that is different than the first reflectivity,

wherein, when the calibration member is mounted within the ADF scanner at the position opposite the imaging surface, the top surface of the second background strip wipes the imaging surface when the body is rotated about the pivot axis during positioning of the second background strip within a field of view of the image capture module during a calibration operation thereof.

2. The calibration member of claim 1, further comprising a compliant strip positioned within and attached to the second longitudinal portion of the outer surface of the body with the second background strip being attached on top of the compliant strip.

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3. The calibration member of claim 1, wherein, when the calibration member is mounted within the ADF scanner and the body is rotated about the pivot axis to position the first background strip in the field of view of the image capture module for an image capture operation of the fed media sheet, a gap is formed between the top surface of the first background strip and the imaging surface allowing the fed media sheet to pass therebetween.

4. The calibration member of claim 1, wherein the top surface of the second background strip comprises a substantially white area.

5. The calibration member of claim 1, wherein the top surface of the first background strip comprises a substantially black area.

6. The calibration member of claim 1, further comprising a transition zone longitudinally extending between the first and second background strips.

7. The calibration member of claim 1, further comprising a third background strip extending along a third longitudinal portion of the outer surface of the body, the third background strip having a thickness that is substantially the same as the first background strip.

8. The calibration member of claim 7, wherein a top surface of the third background strip has a reflectivity that is different from the first reflectivity of the first background strip.

9. A calibration unit for calibrating a stationary image capture module of an automatic document feed (ADF) scanner, the calibration unit comprising:

a housing;

a frame member positioned in the housing to extend substantially parallel to an imaging surface of the image capture module and rotatably mounted within the housing about a pivot axis, the frame member having an outer side that is rotatably moveable across and adjacent to the imaging surface upon rotating the frame member about the pivot axis;

a compliant layer attached to and extending along a longitudinal portion of the outer side of the frame member; and

a calibration strip extending along the longitudinal portion of the outer side of the frame and attached over the compliant layer, the calibration strip having a top surface having a first reflectivity,

wherein the compliant layer and the calibration strip have a stack thickness that is greater than a closest distance between the imaging surface and the outer side of the frame member such that the top surface of the calibration strip wipes across the imaging surface when the frame member is rotated to move the calibration strip in a field of view of the image capture module during a calibration process.

10. The calibration unit of claim 9, wherein the outer side of the frame member includes a substantially arcuate surface and the compliant layer and the top surface of the calibration strip conforms to the arcuate surface of the outer side of the frame member.

11. The calibration unit of claim 9, wherein the top surface of the calibration strip comprises a white area.

12. The calibration unit of claim 9, further comprising at least one image backer extending along a second longitudinal portion of the outer side of the frame member, each of the at least one image backer having a thickness that is less than the closest distance between the imaging surface and the outer side of the frame member such that a gap is defined between the imaging surface and a top surface of each of the at least one image backer to allow a media sheet to pass through the gap when the frame member is rotated to move each of the at

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least one image backer in the field of view of the image capture module during an image capture operation.

13. The calibration unit of claim 12, further comprising a wiper mounted to the housing adjacent to the frame member, the wiper having a length corresponding to at least the second longitudinal portion wherein the wiper wipes the top surface of the at least one image backer when the frame member is rotated into contact with the wiper.

14. The calibration unit of claim 12, wherein the at least one image backer comprises a first image backer and a second image backer, the top surface of the first image backer having a reflectivity that is different from a reflectivity of the top surface of the second image backer.

15. The calibration unit of claim 12, wherein the gap has a height that is about 1 mm.

16. The calibration unit of claim 9, wherein the stack thickness of the compliant layer and the calibration strip is greater than about 1 mm.

17. A system for calibrating a stationary image capture module of an automatic document feed (ADF) scanner, the image capture module having an imaging surface against which a surface of a fed media sheet is scanned by the image capture module, the system comprising:

a housing;

a rotatable frame rotatably disposed in the housing at a position opposite to the imaging surface, the frame having an outer curved surface extending through an aperture in the housing;

an image backer formed on a first longitudinal portion of the outer curved surface of the frame extending substantially parallel to the imaging surface and having a top surface that does not contact the imaging surface when the frame is rotated to position the image backer in a field of view of the image capture module;

a calibration surface portion formed on a second longitudinal portion of the outer curved surface of the frame and extending substantially parallel to the imaging surface, the calibration surface portion having a top surface that contacts the imaging surface when the frame is rotated to position the calibration surface portion in the field of view of the image capture module;

a drive mechanism disposed within the housing and coupled to the frame for rotating the frame; and

a controller in operable communication with the drive mechanism, the controller configured for controlling the drive mechanism to rotate the frame and selectively position the image backer in the field of view of the image capture module during an image capture operation, and the calibration surface portion in the field of view of the image capture module during calibration of the image capture module.

18. The system of claim 17, wherein, during the calibration, the controller is further configured to rotate the frame to allow the image capture module to acquire a plurality of scan lines while the calibration surface portion is moving against the imaging surface.

19. The system of claim 17, further comprising a foam layer attached to and extending along the second longitudinal portion of the frame, wherein the calibration surface portion is disposed over the foam layer.

20. The system of claim 17, wherein the foam layer and the calibration surface portion have a stack thickness that is greater than a closest distance between an outer side of the frame and the imaging surface.

21. The system of claim 17, further comprising a jam door connected to a housing of the ADF scanner adjacent to the imaging surface, wherein the jam door is movable between an

open position and a closed position relative to the imaging surface and the frame is rotatably mounted to the jam door.

22. The system of claim 17, further comprising a position sensor disposed adjacent the frame and in operable communication with the controller, the position sensor providing a signal representative of a position of the frame. 5

23. The system of claim 17, further comprising a second image backer having a reflectivity that is less than a reflectivity of the image backer, wherein the controller is further configured to rotate the frame to position one of the image backer and the second image backer in the field of view of the image capture module based on user input. 10

24. The system of claim 17, further comprising a wiper mounted to the housing adjacent to a first longitudinal edge of the aperture, the wiper having a length corresponding to at least the second longitudinal portion wherein the wiper wipes the top surface of the image backer when the frame is rotated into contact with the wiper. 15

25. The system of claim 24, further comprising a second wiper mounted to the housing adjacent to a second longitudinal edge of the aperture, the second wiper having a length corresponding to at least the second longitudinal portion wherein the second wiper wipes the top surface of the image backer when the frame is rotated into contact with the second wiper. 20

26. The system of claim 25, wherein the first wiper is a foam block and the second wiper is a resilient blade. 25

27. The system of claim 17, wherein the top surface of the calibration surface portion comprises a white area. 30

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