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(54) **A laser-absorbent imaging drum for scanners**

(57) An imaging processor for receiving a medium for processing, the processor comprises a print head for providing and for directing a laser beam. An imaging receptacle positioned adjacent the print head for receiving the medium which is exposed to the medium the laser beam which emits out of the print head and a por-

tion of the laser beam passes through the medium and onto the imaging drum. A laser-absorbent coating is coated onto the imaging drum for absorbing the laser beam that is received by the imaging receptacle for substantially eliminating undesirable artifacts.

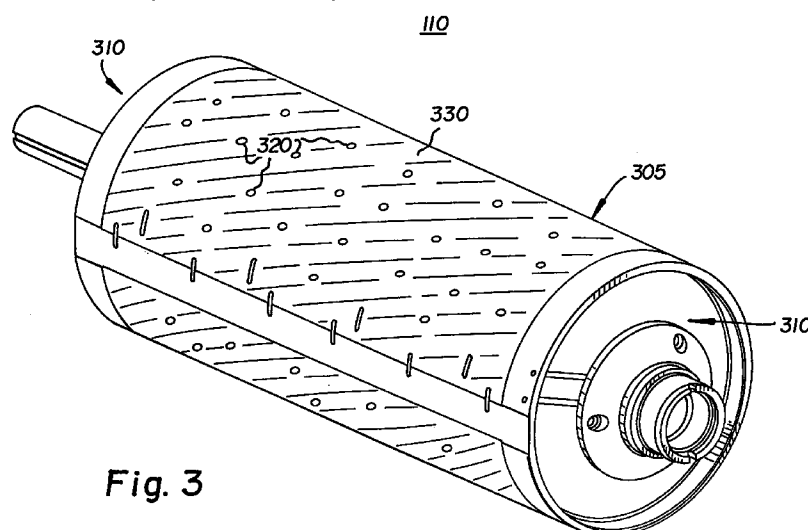


Fig. 3

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Description

Field of The Invention

The invention relates generally to the field of lathe bed scanners utilizing a rotating imaging drum for maintaining the positional relationship of donor element and writing elements during the writing process and, more particularly, to such imaging drums having a laser-absorbent coating for substantially eliminating a undesirable, reflected laser beam which causes artifacts on the writing element during writing.

Background Of The Invention

Color-proofing is the procedure used by the printing industry for creating representative images that replicate the appearance of printed images without the cost and time required to actually set up a high-speed, high-volume printing press to print an example of the images intended. One such color proofer is a lathe bed scanner which utilizes a thermal printer having half-tone capabilities. This printer is arranged to form an image on a thermal print medium, or writing element, in which a donor transfers a dye to the writing element upon a sufficient amount of thermal energy. This printer includes a plurality of diode lasers which can be individually modulated to supply energy to selected areas of the medium in accordance with an information signal.

A print-head includes one end of a fiber optic array having a plurality of optical fibers that are coupled to the diode lasers for transmitting the signals from the laser to the print head. The writing element is supported on a rotatable imaging drum, and the print-head with the fiber optic array is movable relative to the longitudinal axis of the drum. The dye is transferred to the writing element as the radiation, transferred from the diode lasers to the donor element by the optical fibers, is converted to thermal energy in the donor element.

The cylindrical-shaped imaging drum includes a hollowed-out interior portion and further includes a plurality of holes extending through its housing for permitting a vacuum to be applied from the interior of the drum to the receiver and writing elements for maintaining their position as the drum is rotated.

During the writing process, the print head emits the laser beam as it moves along the drum. The beam then passes through the donor element for causing the dye to transfer to the writing element. A portion of the laser beam, or a residual beam, remains because of imperfect thermal transfer, and this residual beam is consequently transferred through the writing element and onto the imaging drum.

Although the presently known and utilized scanner is satisfactory, it is not without drawbacks. The residual beam is reflected off the imaging drum, and is consequently reflected back through the writing element which creates undesirable artifacts in the writing element.

Consequently, a need exists for improvements in the construction of the lathe bed scanner so as to overcome the above-described shortcomings.

Summary Of The Invention

The present invention is directed to overcoming one or more of the problems set forth above. Briefly summarized, according to one aspect of the present invention, the invention resides in an imaging processor for receiving a medium for processing. The processor comprises a print head for providing and for directing a laser beam. An imaging receptacle positioned adjacent the print head for receiving the medium which is exposed to the medium the laser beam which emits out of the print head and a portion of the laser beam passes through the medium and onto the imaging drum. A laser-absorbent coating is coated onto the imaging drum for absorbing the laser beam that is received by the imaging receptacle for substantially eliminating undesirable artifacts.

It is an object of the present invention to coat the drum with a laser-absorbent coating so as to overcome the above-described drawbacks.

It is an advantage of the present invention to provide cost-efficient means for implementing the present invention.

It is a feature of the present invention to provide a laser-absorbent coating coated onto the imaging drum for absorbing the laser beam that is received by the imaging drum for substantially eliminating undesirable artifacts.

The above and other objects of the present invention will become more apparent when taken in conjunction with the following description and drawings wherein identical reference numerals have been used, where possible, to designate identical elements that are common to the figures.

Brief Description Of The Drawings

Fig. 1 is a side view in vertical cross section of a lathe bed scanner of the present invention;

Fig. 2 is a perspective view of an imaging drum, laser writer and lead screw of the present invention; and

Fig. 3 is perspective view of the imaging drum of the present invention.

Detailed Description Of The Invention

Referring to Fig. 1, there is illustrated a lathe bed scanner 10 of the present invention having a housing 15 for forming a protective cover. A movable, hinged door 20 is attached to a front portion of the housing 15 for permitting access to two media trays, a lower tray 30a and upper tray 30b, that are positioned in an interior portion of the housing 15 for supporting receiver material 40, typically paper, thereon. It is obvious to those skilled

in the art that only one media tray 30 will dispense receiver material 40 out of its paper tray 30 for creating an image thereon; the alternate media tray 30 either holds an alternative type of paper or functions as backup. In this regard, the lower media tray 30a includes a cam 50a for lifting the paper 40 upwardly toward a rotatable, lower media roller 60a and, ultimately, toward a second rotatable, upper media roller 60b which, when both are rotated, permits the receiver material 40 to be pulled upwardly towards a media guide 70. The upper media tray 30b also includes a cam 50b for lifting the receiver material 40 toward the upper media roller 60b which directs it towards the media guide 70.

As illustrated by the phantom position, the movable media guide 70 directs the receiver material 40 under a pair of rollers 80 which engages the receiver material 40 for assisting the upper media roller 60b in directing it onto a staging tray 90. The media guide 70 is attached and hinged to the interior of the housing 15 at one end, and is uninhibited at its other end for permitting multiple positioning of the media guide 70. The media guide 70 then rotates its uninhibited end downwardly, as illustrated by the solid line, and the direction of rotation of the upper media roller 60b is reversed for forcing the receiver material 40 resting on the staging tray 90 back under the rollers 80, upwardly through an entrance passageway 100 and around a rotatable imaging drum 110.

Four rolls of donor material 120 (only one is shown) are connected to a carousel 130 in a lower portion of the housing 15, and each roll includes a donor material 120 of a different color, typically black, yellow, magenta and cyan. These donor materials are ultimately cut into sheets and passed to the imaging drum for forming a medium from which dyes imbedded therein are passed to the receiver material resting thereon, which process is described in detail herein below. In this regard, a drive mechanism 140 is attached to each roll 120, and includes three rollers 150 through which the donor material 120 of interest is rolled upwardly into a knife assembly 160. After the donor material 120 reaches a predetermined position, the rollers 150 cease driving the donor material 120 and two blades 170 positioned at the bottom portion of the knife assembly cut the donor material 120 into a sheet. The media rollers 60a and 60b and media guide 70 then pass the donor material 120 onto the drum 110 and in registration with the receiver material 40 using the same process as described above for passing the receiver material 40 onto the drum 110. The donor material 120 rests atop the receiver material 40 with a narrow gap between the two created by microbeads imbedded into the receiver material 40.

A laser assembly 180 includes twenty lasers 185 in its interior, and these lasers are connected via fiber optic cables 187 to a coupling head 190 and ultimately to a write head 200. The write head 200 creates thermal energy from the signal received from the lasers 185 causing the donor material 120 to pass its dye across

the gap to the receiver material 40. The write head 200 is attached to a lead screw 210 via a nut (not shown in Fig. 1) for permitting it to move axially along the longitudinal axis of the drum 110 for writing data onto the receiver material 40.

For writing, the drum 110 rotates at a constant velocity, and the write head 200 begins at one end of the receiver material 40 and traverses the entire length of the receiver material 40 for completing the transfer process for the particular donor material resting on the receiver material 40. After the donor material 120 has completed its dye transfer, the donor material 120 is then transferred from the drum 110 and out of the housing 15 via a skive or ejection chute 210. The donor material eventually comes to rest on a donor material tray 212 for permitting removal by a user. The above-described process is then repeated for the other three rolls of donor material.

After all four sheets of donor material have transferred their dyes, the receiver material 40 is transported via a transport mechanism 220 through an entrance door 230 and into a dye binding assembly 240 where it rests against an exit door 250. The entrance door 230 is opened for permitting the receiver material 40 to enter into the dye binding assembly 240, and shuts once it comes to rest in the dye binding assembly 240. The dye binding assembly 240 heats the receiver material 40 for further binding the transferred dye on the receiver material 40 and for sealing the microbeads thereon. After heating, the exit door 250 is opened and the receiver material 40 with the image thereon passes out of the housing 15 and comes to rest against a stop 260.

Referring to Fig. 2, there is illustrated a perspective view of the imaging drum 110 and write head 200 of the lathe bed scanner 10. The imaging drum 110 is mounted for rotation about an axis (x) in a frame support 270. The write head 200 is movable with respect to the imaging drum 110, and is arranged to direct a beam of actinic light to the donor material 120 (shown in Fig. 1). The write head 200 contains therein a plurality of writing elements (not shown) which can be individually modulated by electronic signals from the laser diodes 185, which signals are representative of the shape and color of the original image, so that each dye is heated to cause volatilization only in those areas in which its presence is required on the receiver material 40 to reconstruct the color of the original object.

The write head 200 is mounted on a movable translator member 280 which, in turn, is supported for low friction slidable movement on bars 290 and 300. The bars 290 and 300 are sufficiently rigid so that they do not sag or distort between the mounting points at their ends and are arranged as parallel as possible with the axis (x) of the imaging drum 110. The upper bar 300 is arranged to locate the axis of the writing head 200 precisely on the axis (x) of the drum 110 with the axis of the writing head perpendicular to the drum axis (x). The upper bar 300 locates the translator member 280 in the vertical and the horizontal directions with respect to the

axis of the drum 110. The lower bar 290 locates the translator member 280 only with respect to rotation of the translator about the bar 290 so that there is no over-constraint of the translator member 280 which might cause it to bind, chatter, or otherwise impart undesirable vibration to the writing head 200 during the generation of an image.

Referring to Figs. 3, there is illustrated the imaging drum 110 having a cylindrical-shaped housing 305 partially and respectively enclosed on both ends by two plates 310. The housing 305 further includes a hollowed-out interior (annular shaped in vertical cross section) for permitting a vacuum to be applied from its interior portion. A plurality of holes 320 extend entirely through the housing 305 for permitting the vacuum to maintain the donor 120 and writing elements 40 thereon during rotation of the drum 110.

A diamond-like carbon (DLC) coating 330, which is commercially available from Diamonex, is applied on the housing 305 by a well known RF (radio frequency) sputtering technique. The coating 330 absorbs a residual laser beam that is not absorbed by the writing element and would otherwise reflect off the drum surface if not absorbed. This absorption substantially eliminates a undesirable, reflected laser beam which typically creates artifacts on the writing element during writing process. The coating 330 is preferably coated to a thickness of between 5000 and 50,000 angstroms, and includes a chemical structure with material properties similar, but not identical, to diamond. It is instructive to note that this type of coating 330 will absorb electromagnetic irradiation in the 600 to 900 nanometer range, which includes the infrared range; scanners typically write in the 800 to 900 nanometer range.

The coating 330 may also be applied by other well known techniques, such as ion beam deposition or plasma assisted chemical vapor deposition. However, RF sputtering is preferred because it requires a lower application temperature and yields a strong bond with the surface of the drum 110.

Other features of the invention are included below.

The imaging drum wherein said coating is diamond-like carbon.

The imaging drum wherein said coating absorbs electromagnetic irradiation in the range of substantially 600 to 900 nanometers.

The imaging drum wherein said imaging drum includes a plurality of perforations for permitting a vacuum to retain the medium onto said imaging drum.

Parts List:

10 scanner
15 housing
20 door
30 media tray
30a lower tray
30b upper tray
40 writing element

50 cams
50a cam
50b cam
60 media rollers
5 60a lower media roller
60b upper media roller
70 media guide
80 rollers
90 staging tray
10 100 entrance passageway
110 imaging drum
120 rolls of donor material
130 carousel
140 drive mechanism
15 150 rollers
160 knife assembly
170 blades
180 laser assembly
185 lasers
20 187 optic cables
190 coupling head
200 write head
210 lead screw
210 ejection chute
25 212 donor material tray
220 transport mechanism
230 entrance door
240 dye binding assembly
250 exit door
30 260 stop
270 frame support
280 translator member
290 lower bar
300 upper bar
35 305 housing
310 end plates
320 holes
330 coating

Claims

1. An imaging processor for receiving a medium for processing, the processor comprising:

45 (a) a print head for providing and for directing a laser beam;
(b) an imaging receptacle for receiving the medium which is exposed to the laser beam which emits out of said print head and a portion of which beam passes through the medium and onto said imaging drum; and
50 (c) a laser-absorbent coating coated onto said imaging drum for absorbing the portion of the laser beam that is received by said imaging receptacle for substantially eliminating undesirable artifacts.

55 2. The imaging receptacle as in claim 1, wherein said coating is diamond-like carbon.

3. The imaging receptacle as in claim 1, wherein said coating absorbs electromagnetic irradiation in the range of substantially 600 to 900 nanometers.
4. The imaging receptacle as in claim 1, wherein said imaging receptacle includes a plurality of perforations for permitting a vacuum to retain the medium onto said imaging receptacle. 5
5. The imaging receptacle as in claim 4, wherein said imaging receptacle includes a substantially cylindrical shape. 10
6. An imaging drum for retaining a medium suitable for writing thereon, the imaging drum comprising: 15
 - (a) a substantially cylindrical-shaped body for retaining the medium which is exposed to a laser beam, a portion of which beam passes through the medium and onto said body; and 20
 - (b) a laser-absorbent coating coated onto said body for absorbing the laser beam that is received by said imaging receptacle for substantially eliminating undesirable artifacts. 25
7. An imaging receptacle for retaining a medium suitable for writing thereon, the imaging receptacle comprising:
 - (a) a platform for retaining the medium which is exposed to a laser beam, a portion of which beam passes through the medium and onto said platform; and 30
 - (b) a laser-absorbent coating coated onto said platform for absorbing the laser beam that is received by said imaging receptacle for substantially eliminating undesirable artifacts 35
8. The imaging receptacle as in claim 10, wherein said coating is diamond-like carbon. 40
9. The imaging receptacle as in claim 10, wherein said coating absorbs electromagnetic irradiation in the range of substantially 600 to 900 nanometers. 45
10. The imaging drum as in claim 10, wherein said platform includes a plurality of perforations for permitting a vacuum to retain the medium onto said platform. 50

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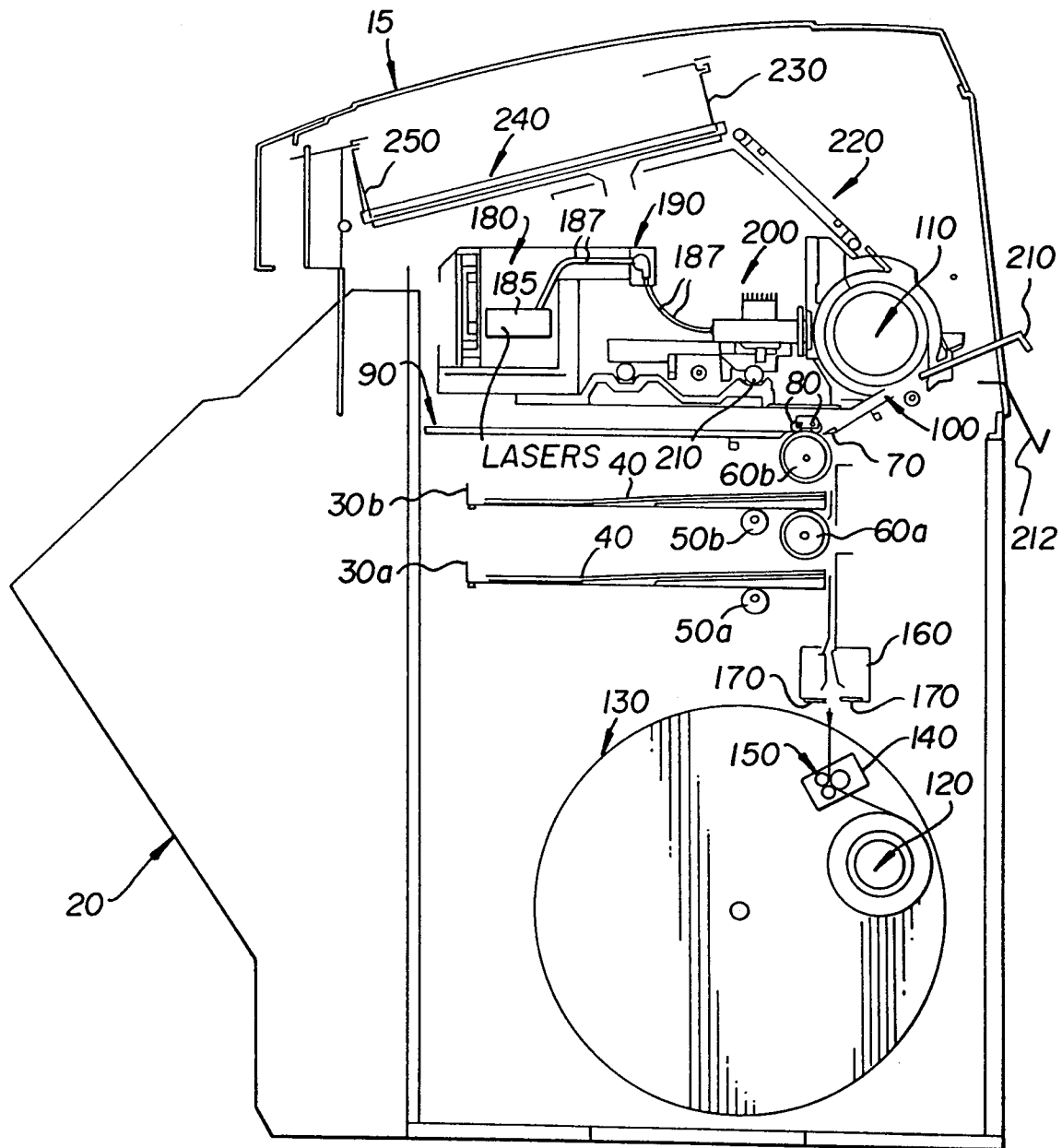


Fig. 1

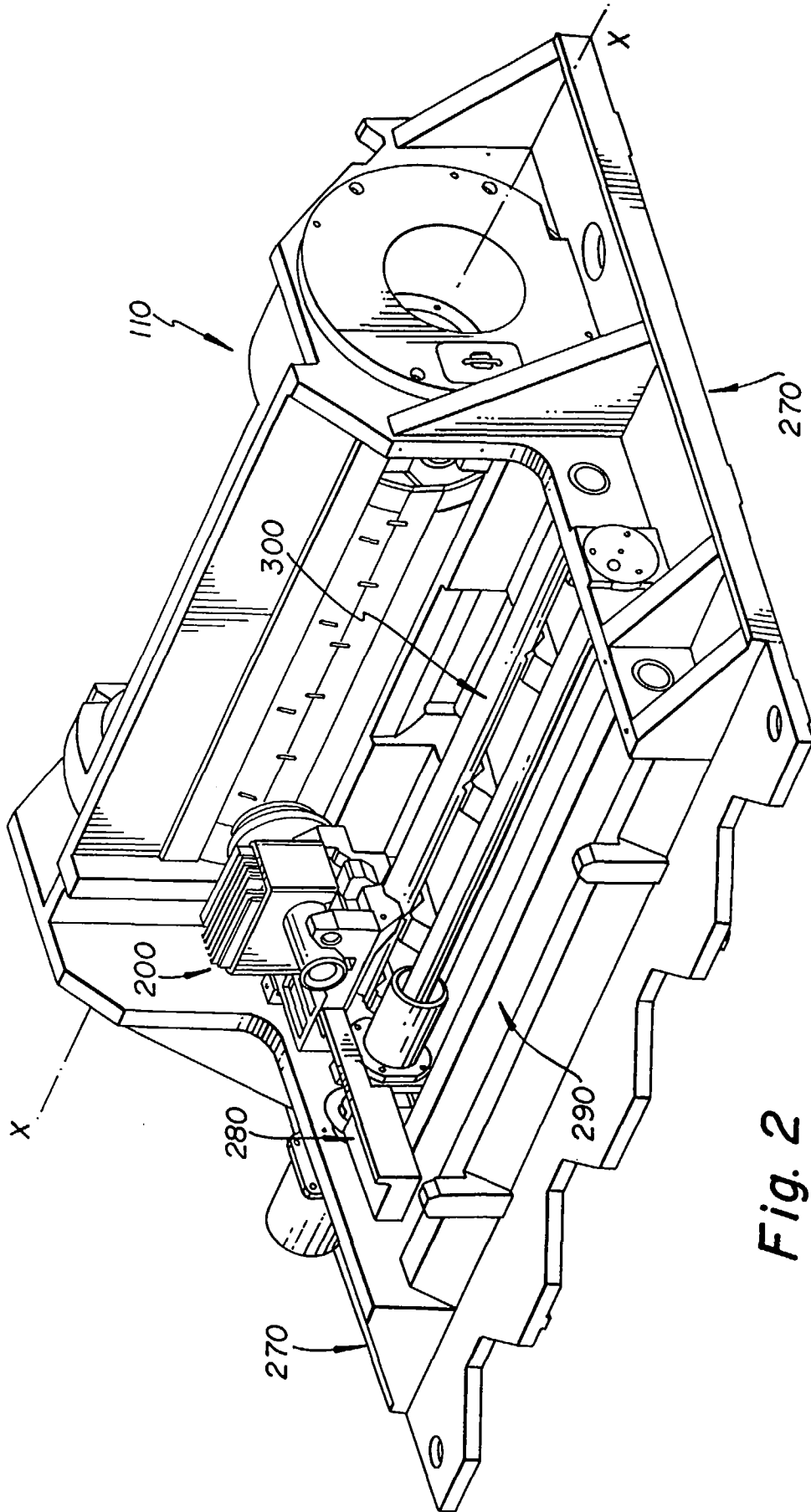


Fig. 2

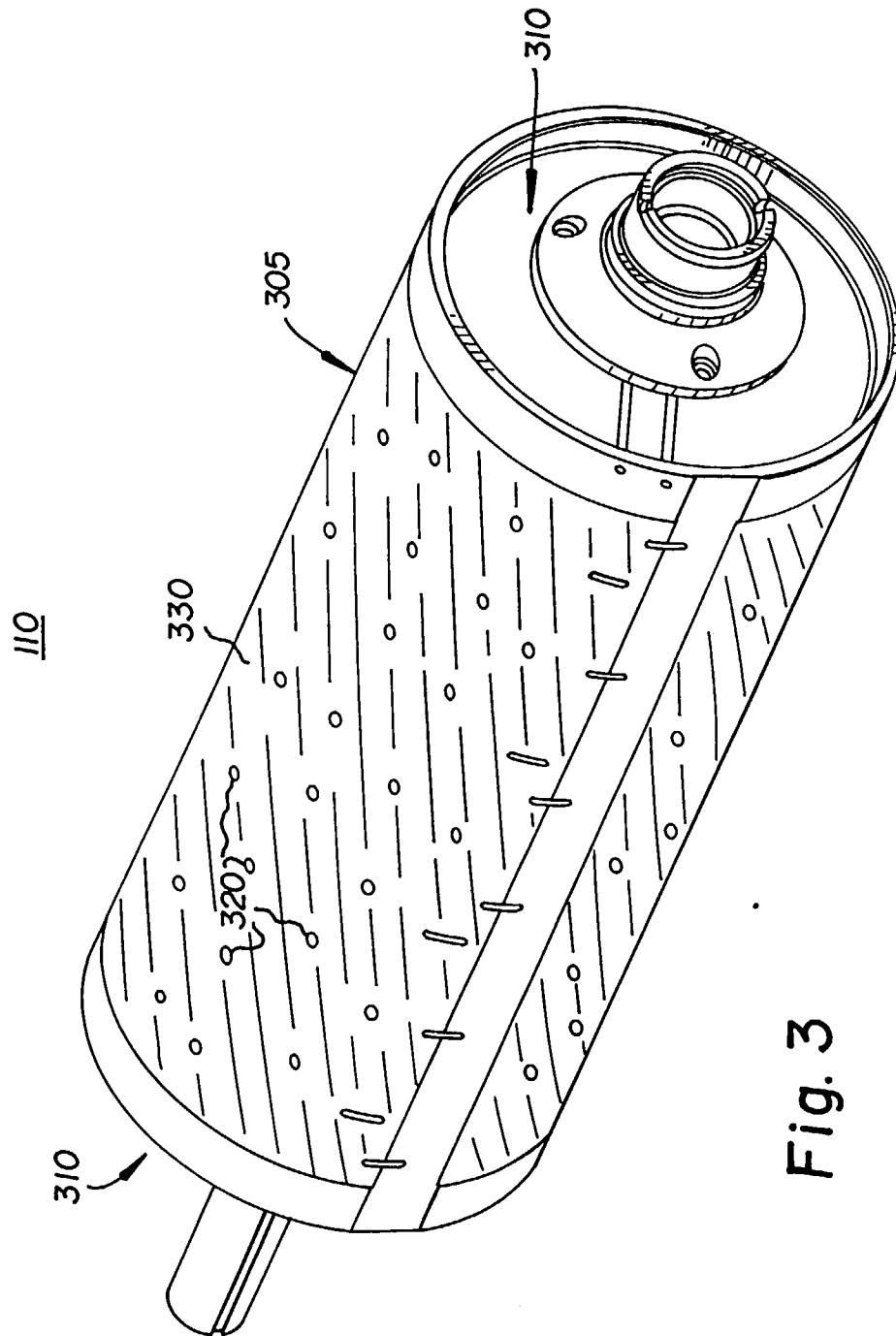


Fig. 3