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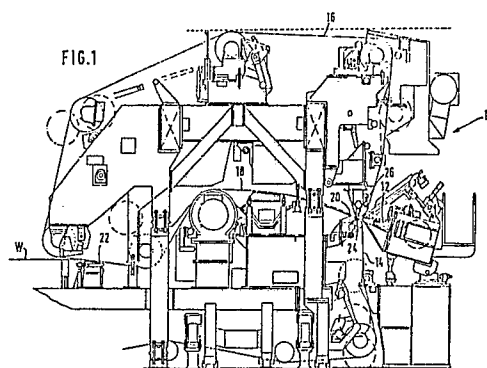
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(54) **An apparatus for forming a web.**

(57) An apparatus (10) is disclosed for forming a web from paper stock ejected from a headbox (12). The apparatus includes a first and a second forming wire (14,16) which cooperate together to define therebetween a forming section (18) having a first and a second end (20,22). The first end (20) of the forming section (18) is disposed adjacent to the headbox (12) such that the stock ejected from the headbox (12) enters the first end (20) of the forming section (18) so that the stock is dewatered during passage from the first (20) towards the second end (22) of the forming section (18). A first turning bar (24) is disposed adjacent to the first end (20) of the forming section (18) for guiding the first forming wire (14) such that the first wire is disposed between the first turning bar (24) and the stock. A second turning bar (26) is disposed adjacent to the first (20) end of the forming section (18) for guiding the second forming wire (16) such that the second wire is disposed between the second turning bar (26) and the stock. The turning bars (24,26) define respectively a first and a second convex surface for slidably engaging the respective wires (14,16) such that the headbox (12) is disposed in close proximity to the first end (20) of the forming section (18) so that disturbance of the stock between the headbox (12) and the first end (20) of the forming section (18) is minimized.



Description**AN APPARATUS FOR FORMING A WEB**BACKGROUND OF THE INVENTIONFIELD OF THE INVENTION

The present invention relates to an apparatus and method for forming a web from paper stock ejected from a headbox. More particularly, this invention relates to a twin-wire forming section in which the headbox is disposed in close proximity to a first end of the forming section.

INFORMATION DISCLOSURE STATEMENT

A typical paper web forming section includes a headbox for ejecting paper stock onto a moving flat screen known as a fourdrinier wire. The stock from the headbox impinges against the moving fourdrinier wire and water within the stock is drained downwardly through the wire so that a fibrous web is formed on the upper surface of the fourdrinier wire.

However, due to the downward drainage of water from the web, the resultant web has an upper surface which displays different surface characteristics from the lower surface of the web. Such two-sidedness, or lack of uniformity between the upper and lower surfaces of the web, has caused problems in the finished product when used for printing in which uniformity of the surfaces is desirable.

Accordingly, forming machines were developed which enabled the web to be dewatered upwardly as well as downwardly. These so-called "twin-wire" machines include an upper wire loop which cooperates with the lower fourdrinier wire such that the stock entering a forming section defined by the upper and lower wires is typically subjected to vacuum applied through the upper wire for removing a further portion of water from the web upwardly through the second wire.

Many twin-wire forming sections have been fitted as retrofits to existing fourdrinier forming sections. Consequently, problems have been experienced in that by the time the stock reached the twin-wire forming section, a considerable downward dewatering and attendant formation had already taken place. Therefore, the uniformity between the upper and lower surfaces of the resultant web have still been less than desirable.

Accordingly, the twin-wire concept was modified by moving the headbox to adjacent a first end of the forming section defined by the cooperating twin wires. The resultant forming section is known as the "BEL BAIE FORMER". BEL BAIE is a registered trademark of Beloit Corporation. The BEL BAIE forming section includes a pair of breast rolls for guiding the respective wires so that the wires

cooperate together to define the aforementioned forming section. However, of necessity, the rotating breast rolls are of a diameter such that it is difficult to position the slice lip of the headbox very close to the first end of the forming section.

Experiments have indicated that when the slice lip of the headbox is moved nearer to the first end of the forming section, less disturbance and breaking up of the stock occurs between the headbox and the first end and the uniformity of the resultant web is improved. Furthermore, less streaking occurs when the slice lip is brought up very close to the first end as the angle at which the stock impinges, or first contacts the lower wire is minimized.

U.S. patent number 4,416,730 to Schiel teaches a former in which the headbox is disposed closely adjacent to a stationary rail 23 such that the lower forming wire 10 passes around the rail 23. A slide shoe 22 is disposed slightly downstream relative to the rail 23 and the former web is removed from the lower wire by suction roller 30. However, this arrangement does not teach the passing of an upper wire around the shoe 22 as the shoe 22 is attached to the headbox.

The present invention reduces the distance between the headbox and the first end of the forming section by using stationary turning bars in place of the aforementioned rotatable breast rolls.

Additionally, by the provision of the aforementioned turning bars, the present invention, when combined with the extended trailing elements as taught by U.S. patent number 4,141,788 assigned to Beloit Corporation, provides a layered sheet having enhanced layer purity.

All the disclosure of the aforementioned U.S. patent number 4,141,788 is incorporated by reference into the subject application.

Therefore, it is a primary object of the present invention to provide an apparatus for forming a web from paper stock that overcomes the aforementioned inadequacies of the prior art proposals and which provides a significant and substantial contribution to the art of paper web formation.

Another object of the present invention is the provision of an apparatus for forming a web in which a first turning bar is disposed adjacent to the first end of a forming section for guiding a first forming wire such that the first wire is disposed between the first turning bar and the stock.

Another object of the present invention is the provision of an apparatus for forming a web including a second turning bar disposed adjacent to the first end of the forming section for guiding the second forming wire such that the second wire is disposed between the second turning bar and the stock.

Another object of the present invention is the provision of first and second turning bars which are stationary for guiding respectively the first and second forming wires.

Another object of the present invention is the

provision of an apparatus for forming a web in which the turning bars define respectively first and second convex surfaces for slidingly engaging the first and second wires respectively such that the headbox is disposed in close proximity to the first end of the forming section so that disturbance of the stock between the headbox and the first end of the forming section is minimized.

Another object of the present invention is the provision of an apparatus for forming a web in which the forming section is disposed vertically with the headbox being disposed beneath the forming section.

Another object of the present invention is the provision of an apparatus for forming a web wherein the forming section and the headbox are disposed horizontally.

Another object of the present invention is the provision of an apparatus for forming a web in which the stock is ejected centrally into the forming section such that the stock first contacts the first and second wires at approximately the same distance from the headbox.

Another object of the present invention is the provision of an apparatus for forming a web in which the headbox is adjustable angularly relative to the first end of the forming section so that a first distance between the headbox and the point at which the stock first contacts the first wire is adjustable relative to a second distance between the headbox and a second point at which the stock first contacts the second wire.

Another object of the present invention is the provision of an apparatus for forming a web in which the first turning bar is disposed downstream relative to the second turning bar.

Another object of the present invention is the provision of an apparatus for forming a web in which the first convex surface defines a leading and a trailing edge with the trailing edge being disposed almost parallel to the stock.

Another object of the present invention is the provision of an apparatus for forming a web in which the second convex surface defines a forward and a rearward portion with the rearward portion being disposed almost parallel to the stock.

Another object of the present invention is the provision of an apparatus for forming a web in which the first and second convex surfaces are ceramic for reducing wear between the respective wires and the turning bars.

Another object of the present invention is the provision of an apparatus for forming a web in which the convex surfaces are fabricated from zirconia.

Another object of the present invention is the provision of an apparatus for forming a web in which the convex surfaces are aluminum oxide.

Another object of the present invention is the provision of an apparatus for forming a web which includes a solid shoe disposed downstream relative to the first turning bar such that the first wire is disposed between the shoe and the stock.

Another object of the present invention is the provision of an apparatus for forming a web in which the shoe defines an upstream and downstream end

such that stock first contacts the first wire between the upstream and downstream ends of the shoe.

Another object of the present invention is the provision of an apparatus for forming a web in which the stock first contacts the first wire between the first turning bar and the solid shoe such that a first portion of water is removed from the stock upstream relative to the solid shoe.

Another object of the present invention is the provision of a first and second shower disposed upstream relative to respectively the first and second turning bars for spraying lubricating water between the wires and the respective turning bars for assisting movement of the wires relative to the respective turning bars.

Another object of the present invention is the provision of a CONVERFLO headbox having trailing elements which extend downstream past the slice lip towards the forming section such that during the manufacture of a three-layer -- or multi-ply -- board, the outer layers maintain the required purity and are not contaminated by excessive defusion from the inner layer lower quality stock.

Other objects and advantages of the present invention will be apparent to those skilled in the art by a consideration of the detailed description contained hereinafter taken in conjunction with the annexed drawings.

SUMMARY OF THE INVENTION

The present invention relates to an apparatus and method for forming a web from paper stock ejected from a headbox. The apparatus includes a first and a second forming wire which cooperate together to define therebetween a forming section having a first and a second end. The first end of the forming section is disposed adjacent to the headbox such that the stock ejected from the headbox enters the first end of the forming section so that the stock is dewatered during passage from the first towards the second end of the forming section. A first turning bar is disposed adjacent to the first end of the forming section for guiding the first forming wire such that the first wire is disposed between the first turning bar and the stock. The second turning bar is disposed adjacent to the first end of the forming section for guiding the second forming wire such that the second wire is disposed between the second turning bar and the stock. The first and second turning bars define respectively a first and a second convex surface for slidingly engaging the first and second wires. The arrangement is such that the headbox is disposed in close proximity to the first end of the forming section so that disturbance to the stock between the headbox and the first end of the forming section is minimized.

In a first embodiment of the present invention, the forming section is disposed vertically with the headbox being disposed beneath the forming section.

In a second embodiment of the present invention, the forming section and the headbox are disposed horizontally.

In both embodiments of the present invention, stock ejected from the headbox is able to enter the forming section centrally such that the stock first contacts the first and second wires respectively at approximately the same distance from the headbox.

Additionally, the angular disposition of the headbox relative to the first end of the forming section is adjustable so that a first distance between the headbox and a first point at which the stock first contacts the first wire is adjustable relative to a second distance between the headbox and a second point at which the stock first contacts the second wire.

In a specific embodiment of the present invention, the first turning bar is disposed downstream relative to the second turning bar and the first convex surface defines a leading and a trailing edge with the trailing edge of the first convex surface being disposed almost parallel to the stock.

The second convex surface defines a forward and a rearward portion with the rearward portion being disposed almost parallel to the stock.

In one embodiment of the present invention, both convex surfaces are ceramic for reducing wear between the respective wires and the turning bars. More specifically, the convex surfaces are fabricated from zirconia.

In another embodiment of the present invention, the convex surfaces are of aluminum oxide.

In a further embodiment of the present invention, a solid shoe is disposed downstream relative to the first turning bar such that the first wire is disposed between the shoe and the stock.

More specifically, the shoe defines an upstream and a downstream end such that the stock first contacts the first wire between the upstream and downstream ends of the shoe.

In an alternative embodiment of the present invention, the stock first contacts the first wire between the first turning bar and the solid shoe such that a first portion of water is removed from the stock upstream relative to the solid shoe.

In yet a further embodiment of the present invention, a first shower is disposed upstream relative to the first turning bar for spraying lubricating water between the first wire and the first turning bar for assisting movement of the first wire relative to the first turning bar. Additionally, a second shower is disposed upstream relative to the second turning bar for spraying lubricating water between the second wire and the second turning bar for assisting movement of the second wire relative to the second turning bar.

In another embodiment of the present invention as shown in figure 5, a CONVERFLO headbox of the type shown in U.S. patent number 4,141,788 is disposed adjacent to the turning bars with a pair of trailing elements extending downstream relative to the slice lip such that the center layer of relatively low quality stock is separated from the outer layers which initially contact the respective wires. The arrangement is such that the purity of the outer layers of the resultant web is maintained thereby providing a multi-ply board having enhanced printing characteristics.

The present invention also includes a method for forming a web from paper stock ejected from a headbox, the method including the steps of:

ejecting the stock from the headbox into a forming section defined by a first and a second forming wire; guiding the first wire around a first turning bar which is disposed adjacent to a first end of the forming section such that the first wire is disposed between the first turning bar and the stock; and

guiding the second wire around a second turning bar disposed adjacent to the first end of the forming section such that the second wire is disposed between the second turning bar and the stock, the turning bars defining respectively first and second convex surfaces for slidably engaging the first and the second wires respectively such that the headbox is permitted to be disposed in close proximity to the first end of the forming section so that disturbance of the stock between the headbox and the first end of the forming section is minimized.

It will be apparent to those skilled in the art that many modifications and variations of the present invention may be carried out without departing from the spirit and the scope of the present invention which is defined by the appended claims. Included in such modifications would be the ejection of stock from above the forming section downwardly towards a first end of the forming section.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a side elevational view of a horizontal twin-wire forming section according to the present invention including stationary turning bars.

Figure 2 is an enlarged side-elevational view of the invention shown in figure 1 showing a first and second stationary turning bar in place of rotating breast rolls.

Figure 3 is a similar view to that shown in figure 2 but shows the headbox adjusted so that the stock impinges the first wire between the first turning bar and the shoe,

Figure 4 is a side-elevational view of another embodiment of the present invention in which the forming section is vertical, and

Figure 5 is a side-elevational view of a further embodiment of the present invention including a CONVERFLO headbox with extended trailing elements as shown in U.S. patent number 4,141,788.

Similar reference characters refer to similar parts throughout the various embodiments of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

Figure 1 is a side-elevational view of a horizontal BEL BAIE forming apparatus generally designated 10 according to the present invention. The apparatus 10 forms a web W from paper stock ejected from a headbox 12. The apparatus 10 includes a first and a

second forming wire 14 and 16 respectively which cooperate together to define therebetween a forming section 18 having a first and a second end 20 and 22 respectively. The first end 20 of the forming section 18 is disposed adjacent to the headbox 12 such that the stock ejected from the headbox 12 enters the first end 20 of the forming section 18 so that the stock is dewatered during passage from the first towards the second end 20 to 22 respectively of the forming section 18. A first turning bar generally designated 24 is disposed adjacent to the first end 20 of the forming section 18 for guiding the first forming wire 14 such that the first wire 14 is disposed between the first turning bar 24 and the stock.

A second turning bar generally designated 26 is disposed adjacent to the first end 20 of the forming section 18 for guiding the second forming wire 16 such that the second wire 16 is disposed between the second turning bar 26 and the stock.

Figure 2 is an enlarged detailed view of the first end 20 of the forming section 18 showing the first and second turning bars 24 and 26 respectively.

The first and second turning bars 24 and 26 define respectively a first and second convex surface 28 and 30 for slidably engaging the first and second wires 14 and 16 respectively such that the headbox 12 is disposed in close proximity to the first end 20 of the forming section 18 so that disturbance of the stock between the headbox 12 and the first end 20 of the forming section 18 is minimized.

As shown in figure 2, the stock 32 ejected from the headbox 12 enters the forming section 18 centrally such that the stock 32 first contacts the first and second wires 14 and 16 respectively at approximately the same distance D from the headbox 12.

As shown in figure 3, the angular disposition of the headbox 12 relative to the first end 20 of the forming section 18 is adjustable so that a first distance D1 between the headbox 12 and the point P1 at which the stock 32 first contacts the first wire 14 is adjustable relative to a second distance D2 between the headbox 12 and a second point P2 at which the stock 32 first contacts the second wire 16.

As shown in figures 2 and 3, the first turning bar 24 is disposed downstream relative to the second turning bar 26 and the first convex surface 28 defines a leading and a trailing edge 34 and 36 respectively. The trailing edge 36 of the first convex surface 28 is disposed almost parallel to the stock 32.

As shown in figures 2 and 3, the second convex surface 30 defines a forward and a rearward portion 38 and 40 respectively with the rearward portion 40 being disposed almost parallel to the stock 32.

Preferably, the convex surfaces 28 and 30 are ceramic for reducing wear between the respective wires 14 and 16 and the turning bars 24 and 26.

In one embodiment of the present invention, the convex surfaces 28 and 30 are fabricated from zirconia and in another embodiment of the present invention, these surfaces are of aluminum oxide.

Figure 2 further shows a solid shoe 42 which is disposed downstream relative to the first turning bar

24 such that the first wire 14 is disposed between the shoe 42 and the stock 32. More particularly, the solid shoe 42 defines an upstream and a downstream end 44 and 46 respectively such that the stock 32 first contacts the first wire 14 between the upstream and downstream ends 44 and 46 of the shoe 42 as shown in figure 2.

However, as shown in figure 3, the angular disposition of the headbox can be adjusted such that the stock 32 first contacts the first wire 14 between the first turning bar 24 and the solid shoe 42 such that a first portion of water is removed from the stock 32 upstream relative to the solid shoe 42.

Figure 2 further shows a first shower 48 disposed upstream relative to the first turning bar 24 for spraying lubricating water between the first wire 14 and the first turning bar 24 for assisting movement of the first wire 14 relative to the first turning bar 24. Also, a second shower 50 is disposed upstream relative to the second turning bar 26 for spraying lubricating water between the second wire 16 and the second turning bar 26 for assisting movement of the second wire 16 relative to the second turning bar 26.

Figure 4 shows a second embodiment of the present invention in which the forming section 18A is disposed vertical with the headbox 12A being disposed beneath the forming section 18A. This arrangement is known as the BEL BAIE III FORMER. BEL BAIE III is a registered trademark of Beloit Corporation.

Figure 5 is a side-elevational view of a further embodiment of the present invention for the manufacture of a multi-ply board having enhanced outer layer purity which results in a web having improved printing characteristics.

More specifically, as shown in figure 5, a headbox generally designated 12B is of the type shown in U.S. patent number 4,141,788 assigned to Beloit Corporation. The aforementioned headbox 12B is a CONVERFLO headbox. CONVERFLO is a registered trademark of Beloit Corporation. The headbox 12B includes trailing elements 52,53,54,55,56 and 57. The elements 53 and 56 extend downstream relative to the slice lip 62. The arrangement is such that during formation, the inner layer 64 of relatively low quality stock does not come into physical contact with the outer layers 66 and 68 which are of a relatively high quality stock until the outer layers 66 and 68 have been dewatered to a certain degree. This has the advantage that migration or diffusion of the relatively low quality stock of the layer 64 into the adjacent layers 66 and 68 is minimized thereby maintaining a very good outer layer purity. Such purity of the outer layers 66 and 68 improves the printability of the resultant board.

In operation of all of the embodiments of the present invention, stock is ejected from a headbox such that the stock enters the forming section at the first end thereof. The first and second wires are guided respectively by first and second turning bars which define convex surfaces such that the slice lip of the headbox may be moved into close proximity to the first end of the forming section thereby minimizing disturbance and breakup of the stock between

the slice lip and the first end 20 of the forming section thereby increasing the uniformity of the resultant web and inhibiting streaking thereof and enabling the angle at which the stock impinges against the first wire to be minimized.

The present invention, by substituting stationary turning bars for rotatable breast rolls, enables the headbox to be positioned very close to the forming section thereby enhancing the uniformity of the resultant web by inhibiting disturbance, breaking up and streaking of the stock.

Although the present invention is useful in the production of all grades of paper and board, the present invention is particularly useful and applicable to the production of fine paper grades and newsprint.

Claims

1. An apparatus for forming a web from paper stock ejected from a headbox, said apparatus comprising:

a first and a second forming wire cooperating together to define therebetween a forming section having a first and a second end; said first end of said forming section being disposed adjacent to the headbox such that the stock ejected from the headbox enters said first end of said forming section so that the stock is dewatered during passage from said first toward said second end of said forming section;

a first turning bar disposed adjacent to said first end of said forming section for guiding said first forming wire such that said first wire is disposed between said first turning bar and the stock; a second turning bar disposed adjacent to said first end of said forming section for guiding said second forming wire such that said second wire is disposed between said second turning bar and the stock; and

said first and second turning bars defining respectively a first and second convex surface for slidably engaging said first and second wires respectively such that the headbox is disposed in close proximity to said first end of said forming section so that disturbance of the stock between the headbox and said first end of said forming section is minimized.

2. An apparatus as set forth in claim 1 wherein said forming section is disposed vertical, the headbox being disposed beneath said forming section.

3. An apparatus as set forth in claim 1 wherein said forming section and the headbox are disposed horizontally.

4. An apparatus as set forth in claim 1 wherein stock ejected from the headbox enters said forming section centrally such that the stock first contacts the first and second wire respectively at approximately the same distance from the headbox.

5. An apparatus as set forth in claim 1 wherein the angular disposition of the headbox

relative to said first end of said forming section is adjustable so that a first distance between the headbox and the point at which the stock first contacts said first wire is adjustable relative to a second distance between the headbox and a second point at which the stock first contacts said second wire.

6. An apparatus as set forth in claim 1 wherein said first turning bar is disposed downstream relative to said second turning bar.

7. An apparatus as set forth in claim 1 wherein said first convex surface defines a leading and a trailing edge, said trailing edge of said first convex surface being disposed almost parallel to the stock.

8. An apparatus as set forth in claim 1 wherein said second convex surface defines a forward and rearward portion, said rearward portion being disposed almost parallel to the stock.

9. An apparatus as set forth in claim 1 wherein said first and second convex surfaces are ceramic for reducing wear between the respective wires and the turning bars.

10. An apparatus as set forth in claim 9 wherein said first and second convex surfaces are fabricated from zirconia.

11. An apparatus as set forth in claim 9 wherein said first and second convex surfaces are of aluminum oxide.

12. An apparatus as set forth in claim 1 further including:

a solid shoe disposed downstream relative to said first turning bar such that said first wire is disposed between said shoe and the stock.

13. An apparatus as set forth in claim 12 wherein said solid shoe defines an upstream and downstream end such that the stock first contacts said first wire between said upstream and downstream ends of said shoe.

14. An apparatus as set forth in claim 12 wherein the stock first contacts said first wire between said first turning bar and said solid shoe such that a first portion of water is removed from the stock upstream relative to said solid shoe.

15. An apparatus as set forth in claim 1 further including:

a first shower disposed upstream relative to said first turning bar for spraying lubricating water between said first wire and said first turning bar for assisting movement of said first wire relative to said first turning bar;

a second shower disposed upstream relative to said second turning bar for spraying lubricating water between said second wire and said second turning bar for assisting movement of said second wire relative to said second turning bar.

16. An apparatus for forming a web from paper stock ejected from a headbox, said apparatus comprising:

a first and a second forming wire cooperating together to define therebetween a forming section having a first and a second end;

said first end of said forming section being disposed adjacent to the headbox such that the stock ejected from the headbox enters said first end of said forming section so that the stock is dewatered during passage from said first towards said second end of said forming section; 5

a first turning bar disposed adjacent to said first end of said forming section for guiding said first forming wire such that said first wire is disposed between said first turning bar and the stock; 10

a second turning bar disposed adjacent to said first end of said forming section for guiding said second forming wire such that said second wire is disposed between said second turning bar and the stock; 15

said first and second turning bars defining respectively a first and second convex surface for slidably engaging said first and second wires respectively enabling the headbox to be disposed in close proximity to said first end of said forming section so that the angle at which the stock impinges onto said first wire is minimized thereby reducing the breakup and disturbance within the stock between the headbox and said first end of said forming section thereby producing a web having improved uniformity and reduced streaking; and 20

a solid shoe disposed downstream relative to said first turning bar such that said first wire is disposed between said shoe and the stock. 25

17. An apparatus for forming a web from paper stock ejected from a headbox, said apparatus comprising:

a first and second forming wire cooperating together to define therebetween a forming section having a first and a second end; 35

said first end of said forming section being disposed adjacent to the headbox such that the stock ejected from the headbox enters said first end of said forming section so the stock is dewatered during passage from said first toward said second end of said forming section; 40

a first turning bar disposed adjacent to said first end of said forming section for guiding said first forming wire such that said first wire is disposed between said first turning bar and the stock; 45

a second turning bar disposed adjacent to said first end of said forming section for guiding said second forming wire such that said second wire is disposed between said second turning bar and the stock; 50

said first and second turning bars defining respectively a first and second convex surface for slidably engaging said first and second wires respectively such that the headbox is disposed in close proximity to said first end of said forming section so that disturbance of the stock between the headbox and said first end of said forming section is minimized; 55

the headbox including:

a slice lip, and

a first and a second trailing element extending from within the headbox to downstream relative 65

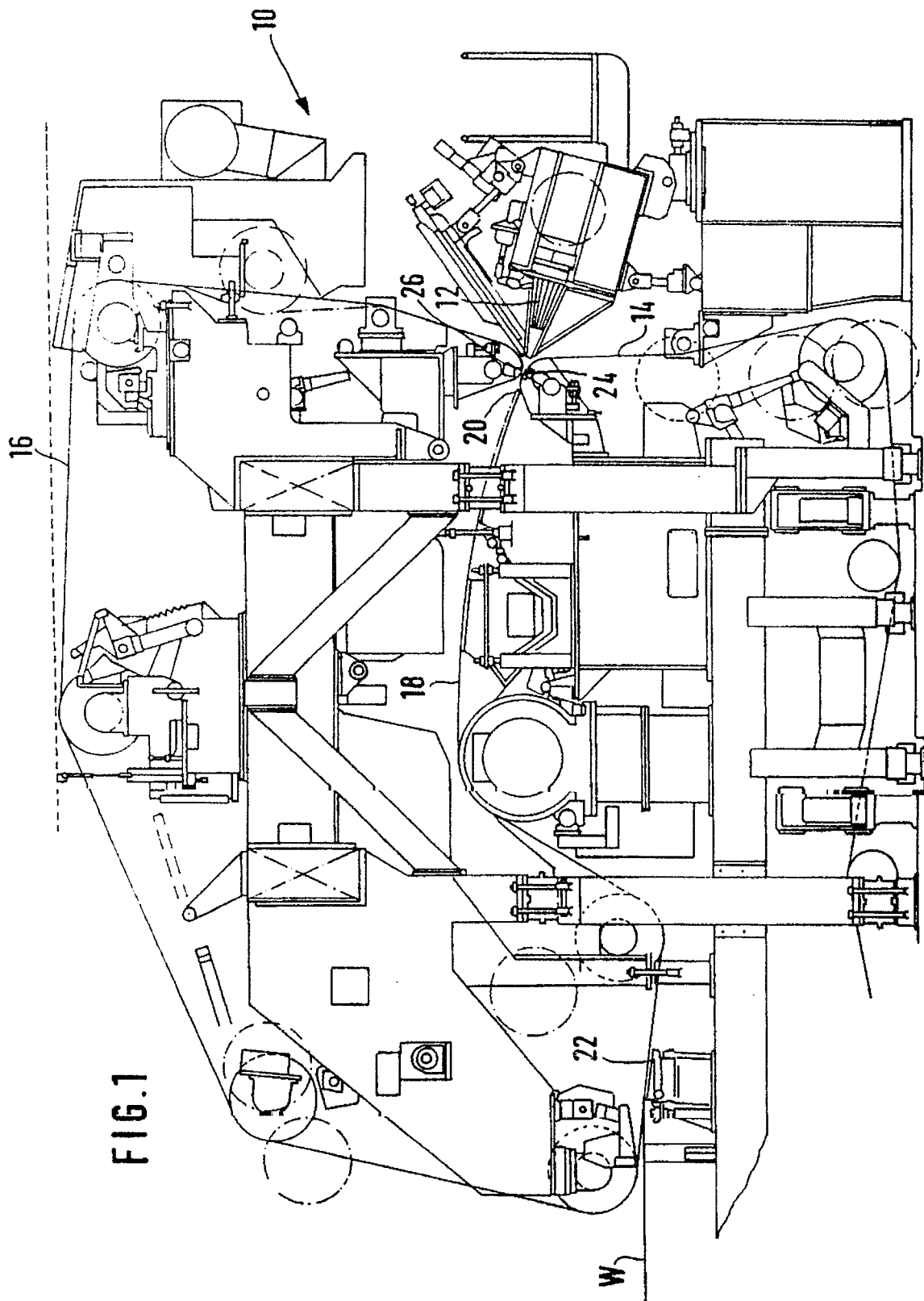
to said slice lip such that during the manufacture of a multi-ply board, a layer of relatively poor quality stock flows between said first and second trailing elements and is separated from outer layers of the stock until said outer layers have been subjected to partial dewatering thereby inhibiting diffusion and migration of said inner layer into said outer layers of relatively high quality stock thereby enhancing the printability of the resultant board.

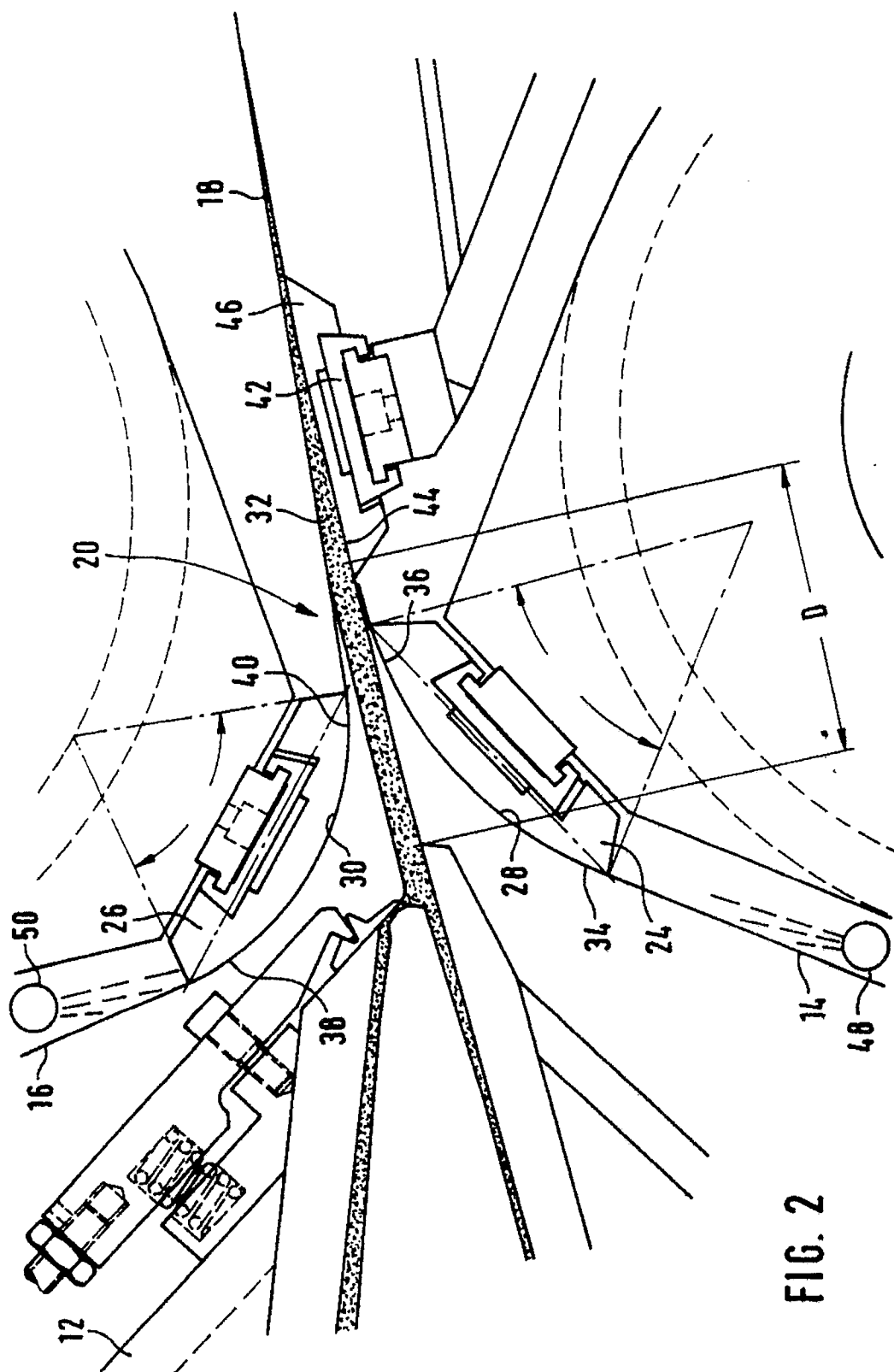
18. A method for forming a web from paper stock ejected from a headbox, said method including the steps of:

ejecting the stock from the headbox between a first and second forming wire which cooperate together to define therebetween a forming section having a first a second end;

guiding the first wire around a first turning bar such that the headbox is disposed in close proximity to the first end of the forming section; and

guiding the second wire around a second turning bar disposed upstream relative to the first turning bar, the first and second turning bars defining respectively first and second convex surfaces for slidably engaging the first and second wires respectively and for enabling the headbox to be disposed in close proximity to the first end of the forming section so that the angle at which the stock first contacts the first wire is minimized thereby inhibiting disturbance within the stock between the headbox and the first end of the forming section.





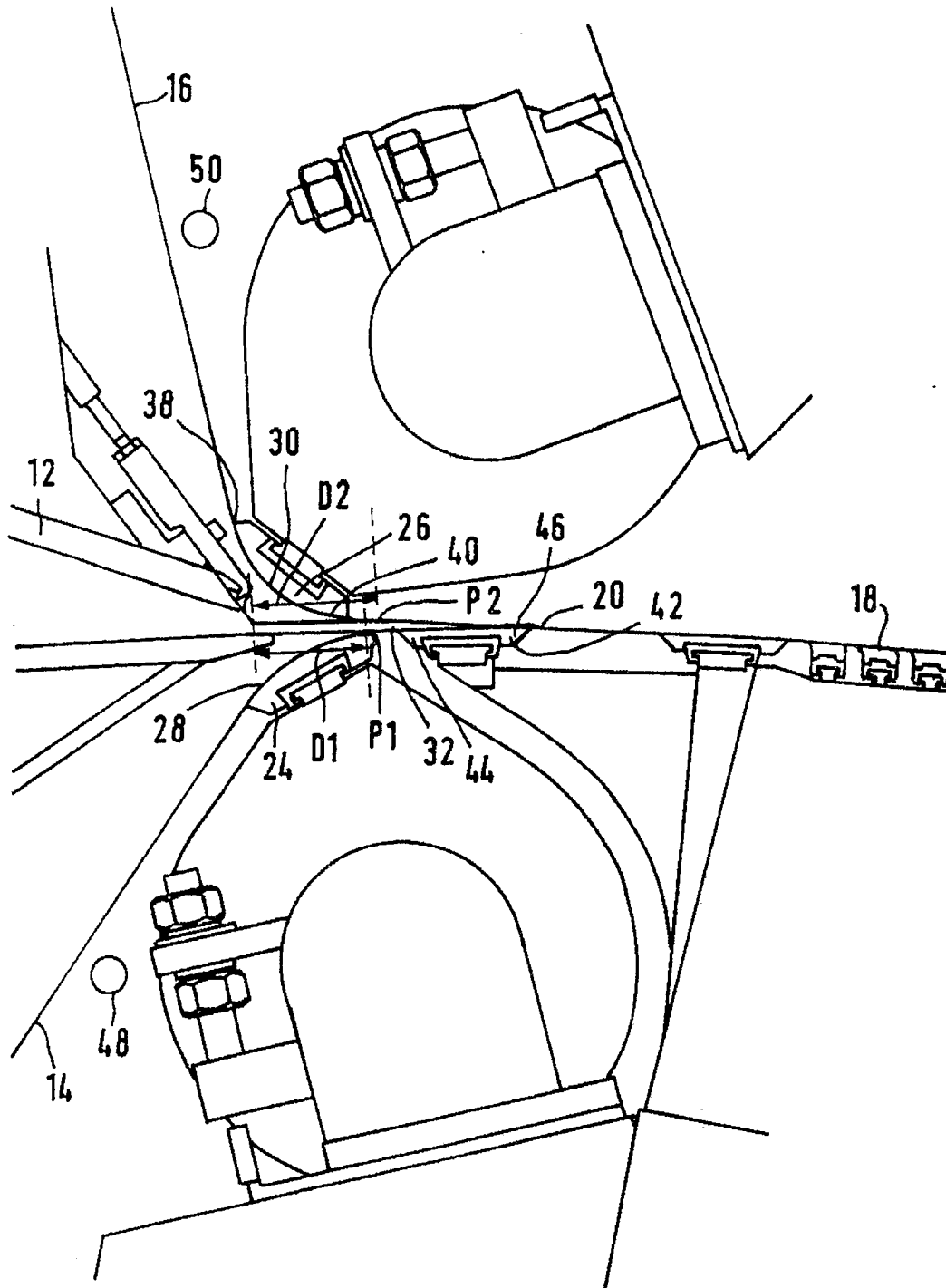
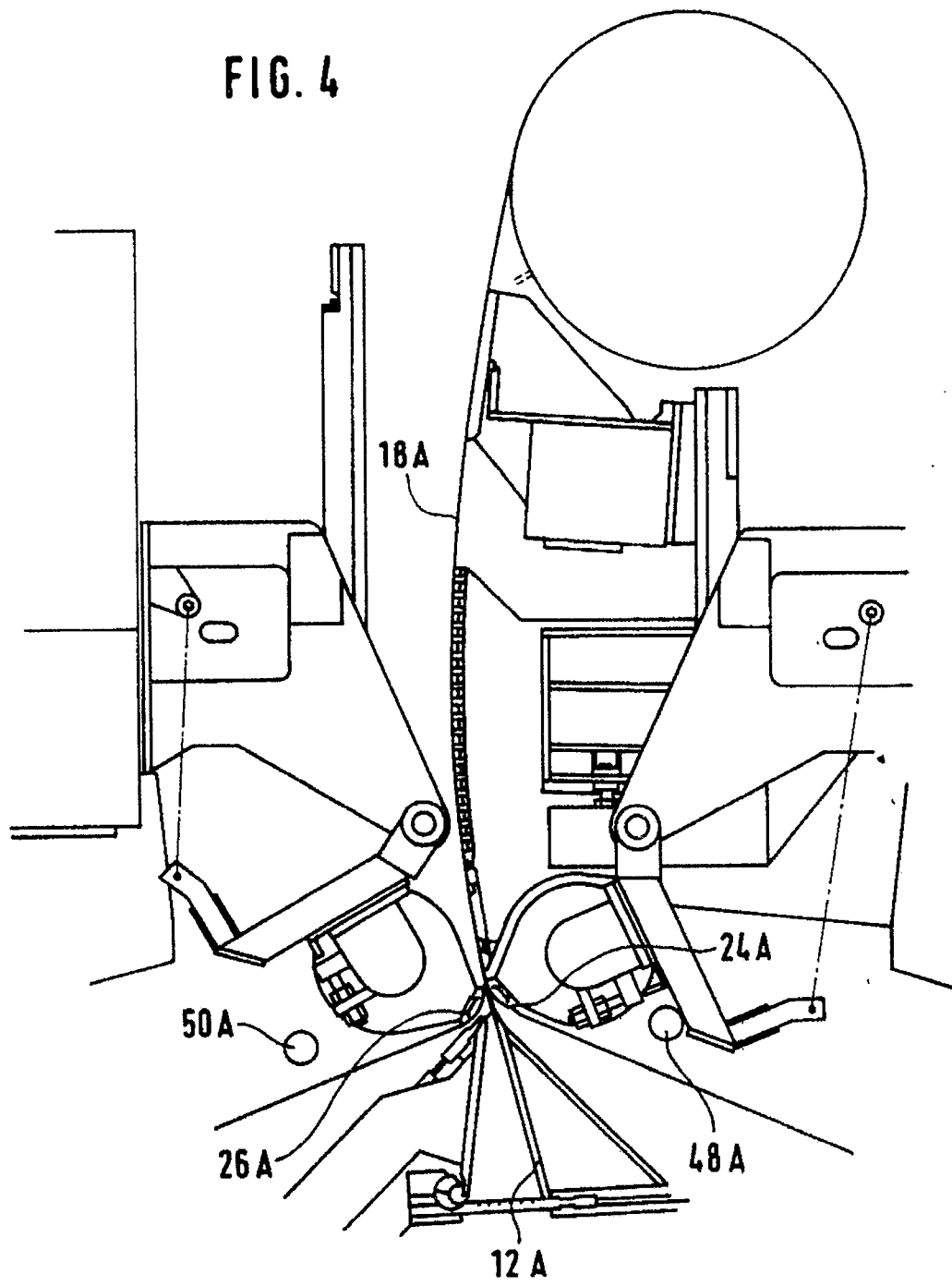


FIG. 3

FIG. 4



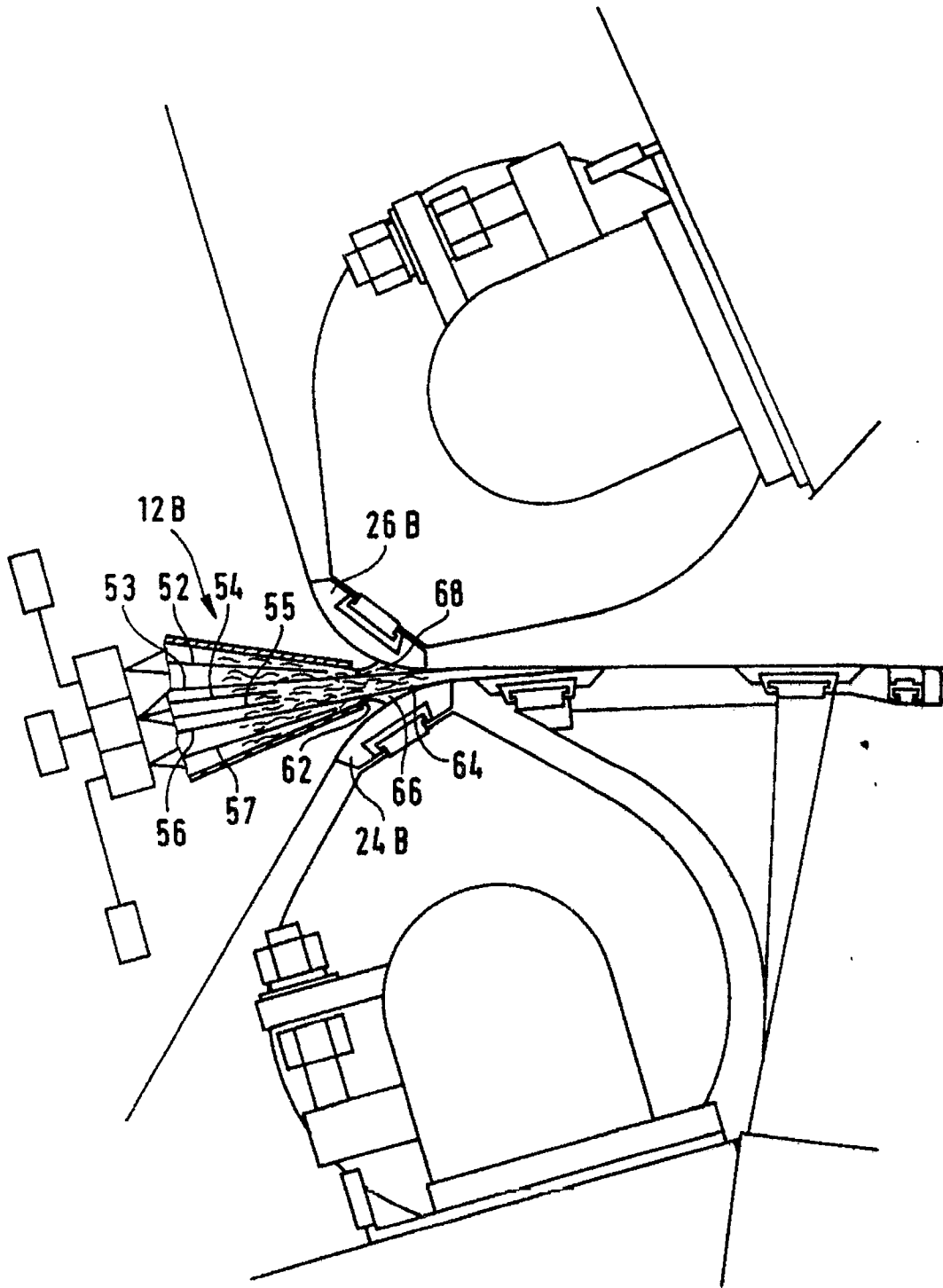


FIG. 5