May 1, 1928. 1,667,755

C. W. VALENTINE

FLOW EVENER ROLL FOR PAPER MAKING MACHINES

Filed July 26, 1927

Fig. 1.

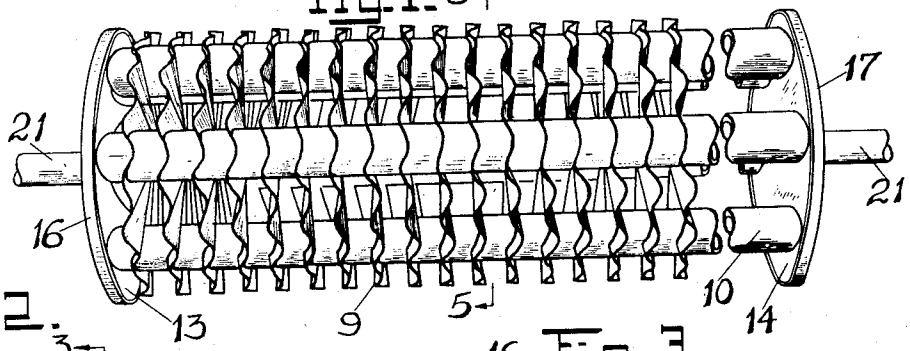


Fig. 2.

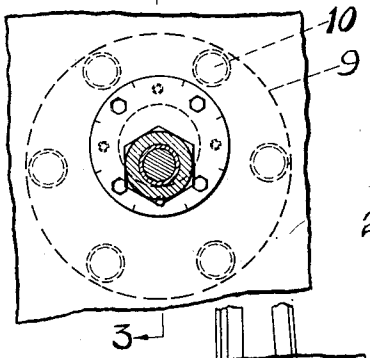


Fig. 3.

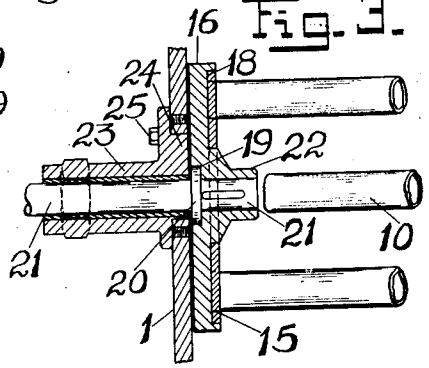


Fig. 4.

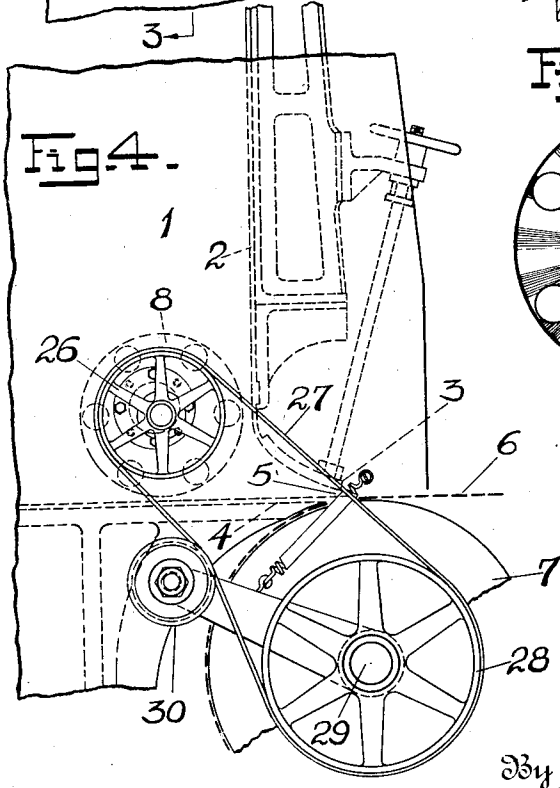


Fig. 5.

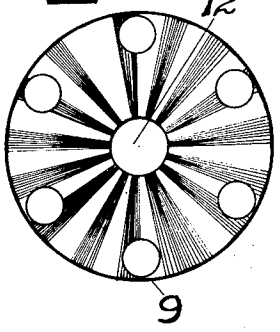


Fig. 6.



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UNITED STATES PATENT OFFICE.

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FLOW-EVENER ROLL FOR PAPER-MAKING MACHINES.

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This invention relates to certain improvements in flow evener devices for the headboxes of paper making machines.

In making paper on a Fourdrinier or like machine, the stock is delivered to the making wire from a container known as a headbox, to which the stock is supplied from any suitable source. The stock is supplied from the headbox to the making wire under a slice, usually adjustable, which regulates the thickness of the stock as it passes onto the wire. In order to make a good web or sheet, it is desirable that the stock pass onto the wire evenly across the machine, so as to avoid the formation of unseparated masses or lumps of stock, and it is further desirable that the stock should go onto the wire at an even speed and with the fibres thoroughly intermingled or mixed, so as to form a strong sheet.

It is also desirable that any formation of strings or lumps in the stock, due to the clogging of the stock at any point, should be avoided as far as possible.

In forming the paper sheet, particularly at high speed, difficulties have been experienced in the proper feed of the stock to the making wire, due to lack of uniform consistency of the stock as supplied or delivered to the head-box. Various constructions have been proposed to overcome this and to secure an even regular feed of the stock. Among these proposals has been that of the use of a hollow roll or cylinder which extends across the slice opening, this cylinder being provided with perforations through which the stock passes, the effect of this being to produce a more even flow of the stock onto the slice to the making wire. Flow evener rolls constructed in this way, however, have certain disadvantages, as the fibres in the stock are not first thoroughly intermingled or mixed, which is desirable for the formation of a strong sheet. Furthermore, in the production of these rolls, certain difficulties have been experienced because, when the perforations are formed in the roll, rough places or burrs are produced around the edges of the perforations in which the stock tends to catch, forming lumps or strings, which would prevent the formation of a good sheet. These burrs, therefore, have to be removed and their removal is a slow and tedious operation, particularly in the case of wide rolls.

It is the object of the present invention to produce a flow evener device for the headboxes of paper making machines so constructed and arranged as to cause the stock to change its direction of flow within certain limits as it passes through the device, so as to effect a thorough intermingling or intermeshing of the fibers and thus produce a strong sheet.

It is a further object of the invention to produce a flow evener construction which can be quickly made and assembled and in which rough edges or other parts which would tend to cause an undesirable formation of strings or lumps are eliminated, so that a smooth surface is presented for the passage through the evener device.

It is a further object of the invention to provide such a construction which can be readily installed in a machine, which is adjustable relatively to the slice, and which can be driven at any desired speed.

With these and other objects not specifically referred to in view, the invention consists in certain novel parts, arrangements and combinations which will be described in connection with the accompanying drawings and the novel features pointed out in the claims hereunto annexed.

In these drawings,—

Figure 1 is a perspective view, partly broken away, of the improved flow evener assembled;

Figure 2 is an end view, partly in section, of the evener installed in a headbox;

Figure 3 is a detail sectional view taken on the line 3—3 of Figure 2;

Figure 4 is an elevation showing the relative location of the evener device to the headbox of the machine;

Figure 5 is an end view taken on the line 5—5 of Figure 1 showing one of the discs, and

Figure 6 is an edge view of the disc shown in Figure 5.

Referring now to these drawings, 1 indicates the headbox of a Fourdrinier machine,

2 the slice frame carrying the adjustable slice 3 which cooperates with the apron board 4 to form the slice opening 5, and 6 indicates the making wire of the machine which passes over the usual driven breast roll 7.

In accordance with the invention, there is provided a flow evener device indicated generally by the numeral 8 in Figure 4, and this flow evener is, as shown, so located with relation to the slice opening 5 that the stock in feeding to the opening passes through the device. The evener is so constructed that there is a thorough intermingling or intermeshing of the fibres in the stock and the stock is quieted down or evened so that a steady flow of stock in proper condition to the wire is produced. This flow evener device, furthermore, will be such that its elements are smooth, so that there will be no rough places in which the stock can collect to form strings or lumps, and the elements of the evener will be of such character that they can be readily formed and assembled without requiring extensive finishing. While the particular construction of this evener may be varied within considerable limits, good results have been obtained by that shown, and the evener shown will be described as of preferred form and as illustrative of the invention.

In the particular construction shown, the evener is in the form of a roll which is made up of a plurality of circular elements, as discs 9, which are supported on smooth pipes or rods 10, a suitable number of these rods being provided for supporting the discs, six such rods being shown. The form and arrangement of these discs form one important feature of the invention. As shown, each disc is formed with an undulating or fluted surface, these flutings being clearly shown in Figure 6 and marked 11.

These discs are arranged widthwise of the roll and spaced apart a distance sufficient to provide a good intermingling of the fibres in the stock, but at the same time prevent any undue endwise or surging movement of the stock which would tend to prevent an even flow through the roll. It will be observed that, taking a given line through the flutings 11 of the discs lengthwise of the roll, the fluting points to the right, while above or below the lips of the fluting point to the left. This results in the stock flowing through the revolving roll and its direction of flow rapidly changes within certain limits, that is, the space between two adjacent discs, which results in a very thorough intermingling of the fibres in the stock and at the same time prevents any surging of the stock as a whole. Thus an even flow of thoroughly mixed stock is maintained without undesirable agitation. It will be observed that each flute is deepest at the periphery of the roll, gradually shallowing out at the center, this construction assisting in the desired action on the stock.

If desired, slight endwise movement of the stock as a whole may be provided to produce a further intermingling or intermeshing, and this is effected by providing a central aperture, indicated at 12, through the discs, this aperture, however, not being sufficiently large to permit any undue endwise movement of the stock. The provision of this opening also facilitates the crimping or fluting of the discs and thus assists in the speed of production in the manufacture of the discs. It will be further observed that the surfaces of the flutings are smooth, as are also the pipes 10, so that there are no projections or burrs which will act to catch the stock, the discs being fitted onto the pipes with a close fit. The pipes 10 may be mounted so that the roll may be rotated in any suitable manner. In the particular construction illustrated there is provided a pair of spiders 13, 14, one of which is shown in detail in Figure 3. These heads are provided with apertures, indicated at 15, in which the ends of the pipes 10 are secured in any suitable manner, as by means of solder. As shown, the hollow pipes 10 are preferably employed for lightness in manufacturing, being made of light metal and requiring no machining or finishing in order to provide a smooth passage of the stock through the roll.

The roll may be supported in any suitable manner. As shown, the roll is a driven roll and includes a pair of heads 16, 17, which are provided with a recess 18 on the inside of the heads, into which the spiders may be fitted with a driving fit, or secured in any other desired manner.

In accordance with the invention, means are provided for effecting an adjustment of the roll relatively to the headbox and the slice and for driving the roll at varying speeds. While the particular construction for effecting this may be somewhat varied, one of the heads, as the head 16, at its outer face, is recessed at 19 to receive a collar 20 on a shaft 21, the inner face of the head being provided with a hub 22 in which the shaft is keyed, this hub forming a bearing for the shaft. This shaft extends through the headbox 1, before referred to, and, outside the headbox, extends through a sleeve 23 forming a part of an eccentric 24 adjustably secured to the headbox by bolts 25. By loosening the bolts, the eccentric sleeve 23 may be rotated and thus adjust the roll to and from the bottom of the headbox and from the slice. This shaft 21 may be driven in any suitable manner, but in the preferred construction would be driven so that the speed can be varied. As illustrated, the shaft, at one end, outside the headbox, car-

ries a pulley 26 which is driven by a belt 27 by a cone pulley 28 on a driven shaft 29. A belt adjustor, in the form of a roll 30, is provided for adjusting the belt when the eccentric sleeve is adjusted. If desired, however, the roll may be driven in other ways, as by a variable speed motor.

With the construction described a flow evener roll has been provided which can be made and assembled without extensive machining, and in which there are no rough edges for causing the collection of stock. The arrangement of the fluted discs, furthermore, effects a good intermingling or intermeshing of the fibres in the stock without undue agitation and an even flow of stock to the wire is provided. While the roll shown is the preferred construction, it will be understood that various changes may be made in the form and assemblage of the roll elements and in the means for driving the roll without departing from the invention as defined in the appended claims.

What I claim is:

1. A flow evener device for the headboxes of paper making machines, comprising a rotatable element composed of a plurality of circular elements having undulating or fluted surfaces.

2. A flow evener device for the headboxes of paper making machines, comprising a rotatable element composed of a plurality of circular elements having undulating or fluted surfaces, each flute being deepest at the periphery of the element.

3. A flow evener device for the headboxes of paper making machines comprising a rotatable element composed of a plurality of discs having fluted surfaces, the flutings extending in the same direction.

4. A flow evener device for the headboxes of paper making machines, comprising a rotatable element composed of a plurality of discs having fluted surfaces extending in the same direction, each flute being deepest at the periphery of the disc.

5. A flow evener device for the headboxes of paper making machines, comprising a roll made up of a plurality of discs having fluted surfaces, pipes on which the discs are mounted, and spiders in which the ends of the pipes are secured.

6. In a paper making machine the combination of a headbox and slice, a flow evener device located in the headbox adjacent the slice, and means for adjusting the device toward and from the slice.

7. In a paper making machine, the combination of a headbox and slice, a flow evener roll located in the headbox adjacent the slice, and an eccentric connection for the roll for adjusting it with relation to the slice.

8. In a paper making machine, the combination of a headbox and slice, a flow evener roll located in the headbox adjacent the slice, means for adjusting the roll towards and away from the slice, and means for driving the roll at varying speeds.

9. A flow evener device for the headboxes of paper making machines, comprising a roll made up of a pair of heads, pipes mounted in the heads, and discs mounted on the pipes between the heads.

10. A flow evener device for the headboxes of paper making machines, comprising a roll made up of a plurality of discs having fluted surfaces, and an aperture for the passage of stock in the discs.

11. In a paper making machine, the combination of a headbox and slice, a flow evener roll located in the box adjacent the slice and including a pair of heads, an eccentric sleeve secured to one of the heads, and means for adjusting the sleeve.

12. A flow evener device for the headboxes of paper making machines, comprising a roll made up of a plurality of discs arranged to cause a sidewise movement of the stock within predetermined limits as it passes through the roll.

In testimony whereof, I have hereunto set my hand.

CHARLES W. VALENTINE.