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PAPER MAKING MACHINE

2,345,647

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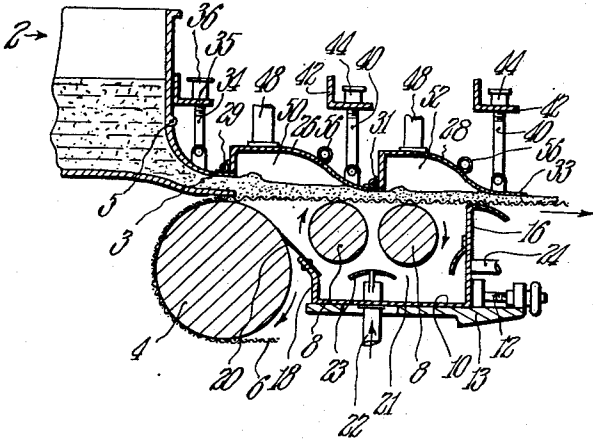


Fig. 1.

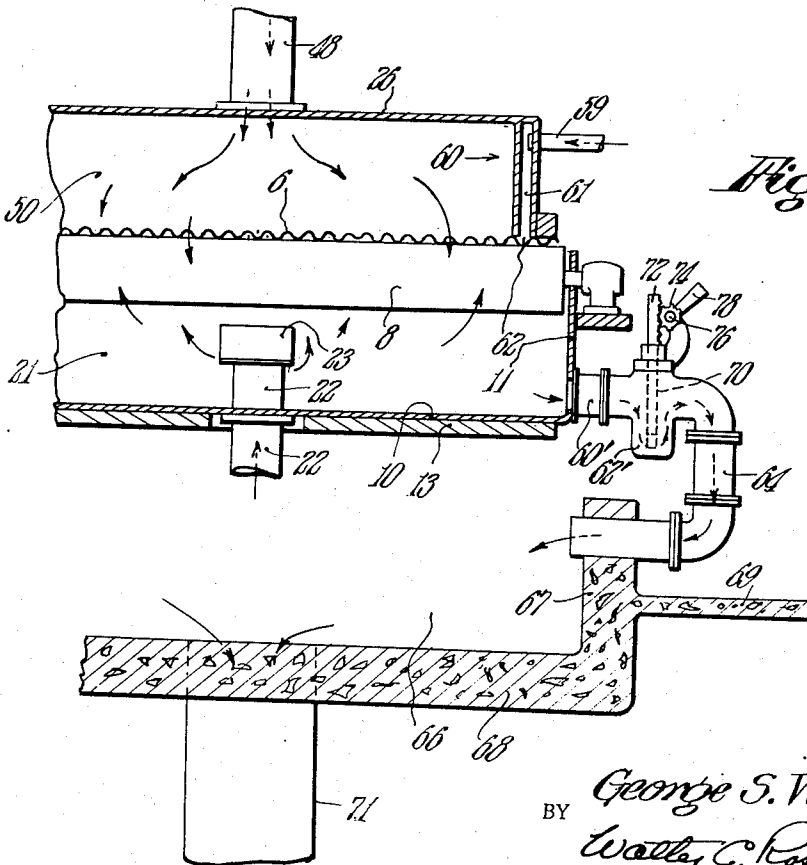


Fig. 2.

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PAPERMAKING MACHINE

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4 Claims. (Cl. 92-44)

This invention relates to the manufacture or forming of webs by applying to a foraminous surface fibers suspended in a liquid, and this application is a continuation in part of an application Ser. No. 341,716, filed by me on June 21, 1940.

The principal objects of this invention are directed to improvements in the methods of and apparatuses for making or forming webs of paper, pulp and the like and is directed more particularly to improvements in the method of and apparatus for acting on the material from which the web is formed particularly during that part of the paper-making process when the fibers are being relatively arranged, or the web is being formed.

The novel features of the invention are adapted for broad application wherever it is desired to form a web on a foraminous surface from fiber containing stock. That is the invention is useful in connection with any movable foraminous element where fibers are deposited on the element to form a web, but the novel features thereof will for purposes of this disclosure be described in connection with a Fourdrinier machine.

According to the inventions of this application, a gas such as air is applied to the fibers on the foraminous element at such a time and in such a way as to improve the formation of the web being formed. That is, the air is directed onto the web forming fibers in such a way as to produce numerous advantageous results among which are: the fibers are pressed onto the foraminous element more or less so as to be held thereon whereby the rate of travel of the stock quickly attains that of the element, the stock is freed of entrapped air which usually results in blemishes and other imperfections, water elimination is increased so that lower densities may be used, formation is greatly improved, a very desired leveling of stock takes place, and speed of the foraminous element may be greatly increased, thereby, of course, to increase production and at the same time produce an improved grade of sheet.

The above-mentioned novel advantages and objects of the invention are but few of the many and the novel method and apparatus are adapted for use in connection with a wide range of methods and apparatus for forming webs from fibrous materials or for treating such fibers all as will hereinafter appear.

The present preferred form of the invention is hereinafter disclosed by the following descrip-

tion in connection with the flow box end of a Fourdrinier machine. It will be understood that various changes and modifications may be made to include the novel features and advantages of the invention and that numerous advantages and objects not specifically mentioned heretofore come within the spirit and scope of the invention.

In the drawing:

Fig. 1 is a more or less diagrammatic longitudinal sectional elevational view of a portion of the flow box and of a Fourdrinier machine having the novel features of the invention associated therewith; and

Fig. 2 is a more or less diagrammatic transverse sectional view through a Fourdrinier machine close to the breast roll and flow box such as shown in Fig. 1 to explain the invention.

Referring now to the drawing in detail, the invention will be more fully described in connection with a Fourdrinier machine such as used in the paper making industry.

A flow box for the stock is represented by 2 beneath and adjacent to this is shown a breast roll 4 with the Fourdrinier wire 6 running to the right in the direction of the arrow shown. Table rolls 8 for the wire are disposed forwardly of the breast roll. Below the wire 6 there is a casing or saveall 10 closed at opposite ends by walls 11 and the casing is slidable back and forth relative to a bracket or brackets 13 and is adjusted by screws 12 towards and away from roll 4. A front wall 16 of the casing extends upwardly so as to closely underlie the wire 6 and a flexible member 18 on the rear wall 20 lies against or is closely adjacent roll 4. The walls or casing provide a substantially closed lower compartment or chamber 21 beneath the wire adjacent the breast roll 4 and air may be admitted thereinto by a pipe or pipes such as 22.

Air may be delivered to the chamber 21 from any suitable means and the air connections will be such as to permit movements of the structure as may be desired. There may be as many air inlets to the lower chamber 21 as may be desired and necessary. The inlet or inlets such as 22 may carry deflectors such as 23. Generally air is directed upwardly towards the wire 6. There may be an outlet or outlets 24 with valves or other control means to assist in controlling air pressure in the chamber 21, if desired.

In the normal operation of a Fourdrinier machine the breast roll has a tendency to cause the water to be drawn by capillary attraction through the wire as do the first one or two or the first

few table or tube rolls. At this stage the fibers of paper stock on the wire are assuming their interlacing relation, and it is necessary for the desired web formation that they be free enough to accomplish this. The sudden extraction of water as mentioned rather impedes or interferes with the formation of the sheet or web.

Air directed upwardly into the chamber 21 beneath the wire as mentioned overcomes the tendency of improper and undesired formation by acting through the wire to cause the stock to float to some extent on the wire and without interfering with the desired water extraction. The amount or pressure of air in chamber 21 may be varied to accomplish the desired results. The action of the air overcomes the objectionable tendency of the breast roll as set forth above.

A sealing plate or plates such as 26 and 28 are provided the former of which is pivoted at 29 to lip 3 of the box 2 while the latter is pivoted at 31 to the forward lip 27 of plate 26. A lip 33 extends forwardly and downwardly of plate 28. The lip 3 is pivoted at 5 to the forward wall of box 2.

The lip 3 is adjustable by means of screws 34 extending through a transverse member 35 and rotatable members 36 in threaded engagement therewith. The plates 26 and 28 at their forward or right hand ends are adjustable up and down by screws 40 extending through transverse supports such as 42 and manually engageable members such as 44 in threaded engagement therewith. The means described facilitates the lips 3, 27, and 33 being disposed at the desired distance from or above the wire.

Conduits such as 48 associated with the plates 26 and 28 are for delivering air to chambers 50 and 52 formed by the plates 26 and 28 and side walls such as 60, see Fig. 2.

The side walls such as 60 extend downwardly so that their lower sides or edges are closely adjacent the wire 6 and co-operate with the plates to provide the substantially closed compartments 50 and 52 over the wire. The side walls are preferably hollow or chambered at 61 and at their lower sides are provided with ports or slots 62 so that water led thereto, by a pipe or pipes 59, is directed downwardly onto the wire. The water acts as a water seal to seal the compartments at their lower sides.

Transverse conduits 56 are provided on plates 26 and 28 which with the said plates are provided with ports or slots so that air may be vented if desired. Valves in association with conduits may be provided to limit or control the venting, although the same may not be necessary in all cases.

In the form of the invention shown, there are two upper chambers 50 and 52 but it will be appreciated that the construction may include one or any number of separate compartments or chambers.

In operation the stock, more or less floating on the wire so that the fibers may assume the relation to bring about the most desirable formation, is acted upon by air supplied chambers 52 and 52 from conduits 48. This air acts in such a way that water is extracted or forced through the web rather than being removed by the breast and tube rolls prior to proper formation. The web being formed is held on the wire, entrapped air is dissipated, and the stock forming the web is allowed to attain the speed of the wire and the fibers assume the most desirable formation.

Because of the air or air pressure there is an increase of water extraction at the proper point so that lower densities may be used which is an advantage in many cases. The air acts somewhat after the manner of a doctor for leveling and the speed of the wire may be increased, all of which tends to facilitate more uniform paper, higher speeds, and increased production.

Depending on the grade of paper being produced and other operating conditions, the pressure of the air delivered through conduits 48 may vary from a few ounces to several pounds. Preferably the air will be relatively dry and at a temperature somewhat above that of the stock.

In order to provide adequate means for carrying the white water away and at the same time maintain the desired air pressure in the lower chamber, the following is provided.

A connection 60', see Fig. 2, is provided at one and preferably both sides of the lower chamber to which are connected goose necks, such as 62'. Other connections such as 64 extend downwardly to the mixing pit 66 formed by walls 67 and 68 adjacent floor 69. A conduit or conduits such as 71 extends to the mixing or supply pump. A stock or stock pipes, not shown, may be connected to the conduit or conduits or to the said pump.

In the goose neck 62' there is a gate 70 arranged for up and down movements and this may be actuated by a toothed rod or rods 72 in mesh with which is a gear 74 of a shaft 76 oscillatable by some suitable means such as a lever 78.

The goose neck 62' and connections whether at one or both sides of the machine may be of such width longitudinally of the machine or of such capacity as to permit of ready flow of white water away from the chamber 21, as in the form of the invention being described to the mixing pit 66.

The gate or gates 70 by being adjustable up and down provide means for sealing the chamber 66 thereby preventing the escape of air to an objectionable extent.

Manifestly the specific details of construction may be considerably varied from those herein shown and described without involving any departure from the principle of the invention or sacrificing any of the advantages inherent therein. While I have described my invention in this specification in great detail and particularly with respect to the present preferred form thereof, it is not desired to be limited thereto since many changes and modifications may be made therein without departing from the spirit and scope of the invention.

The invention may be embodied in other specific forms without departing from the essential characteristics thereof. Hence, the present embodiments are therefore to be considered in all respects merely as being illustrative and not as being restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all modifications and variations as fall within the meaning and purview and range of equivalency of the appended claims are therefore intended to be embraced therein.

What it is desired to claim and secure by Letters Patent of the United States is:

1. The combination of the flow box, adjacent breast roll, the Fourdrinier wire, and the table rolls of a paper machine with pressure-applying means comprising, a casing below and co-operating with said wire to form a lower chamber

enclosing said table rolls, said casing including a rear wall which is relatively flexible and normally disposed closely adjacent said breast roll, means for admitting air under pressure into said chamber, a sealing plate above and co-operating with said wire to form an upper chamber, said sealing plate being pivoted relative to said flow box so as to be movable relative to the wire and being provided with a forward lip part, means for adjusting said lip part relative to the wire, and means for admitting air under pressure to said upper chamber.

2. The combination of the flow box, adjacent breast roll, the Fourdrinier wire, and the table rolls of a paper machine with pressure-applying means comprising, a casing below said wire substantially enclosing said table rolls and co-operating with said wire to form a lower chamber, said casing including a rear wall which is relatively flexible and normally disposed closely adjacent said breast roll, means for admitting air under pressure into said chamber including inlet pipes which are provided with deflectors, a sealing plate above and co-operating with said wire to form an upper chamber, said sealing plate being pivoted relative to said flow box so as to be movable relative to the wire and being provided with a forward lip part, means for adjusting said lip part relative to the wire, and means for admitting air under pressure to said upper chamber.

3. The combination of the flow box, adjacent breast roll, the Fourdrinier wire, and the table rolls of a paper machine with pressure-applying means comprising, a casing below and co-operating with said wire to form a lower chamber

enclosing said table rolls, said casing including a rear wall which is relatively flexible and normally disposed closely adjacent said breast roll, means for admitting air under pressure into said chamber, a lip member pivoted to the forward side of said flow box, means for adjusting said lip member relative to the wire, a sealing plate above and co-operating with said wire to form an upper chamber, said sealing plate being pivoted to said lip member so as to be movable relative to the wire and being provided with a forward lip part, means for adjusting said lip part relative to the wire, and means for admitting air under pressure to said upper chamber.

4. The combination of the flow box, adjacent breast roll, the Fourdrinier wire, and the table rolls of a paper machine with pressure-applying means comprising, a casing below and co-operating with said wire to form a lower chamber enclosing said table rolls, said casing being adjustable back and forth relative to the breast roll and including a rear wall which is relatively flexible and normally disposed closely adjacent said breast roll, means for admitting air under pressure into said chamber, a sealing plate above and co-operating with said wire to form an upper chamber, said sealing plate being pivoted relative to said flow box so as to be movable relative to the wire and being provided with a forward lip part, means for adjusting said lip part relative to the wire, and means for admitting air under pressure to said upper chamber, and means for controlling the air pressure in said upper chamber.

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