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A. E. COFRIN

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PAPER MAKING MACHINE AND PROCESS

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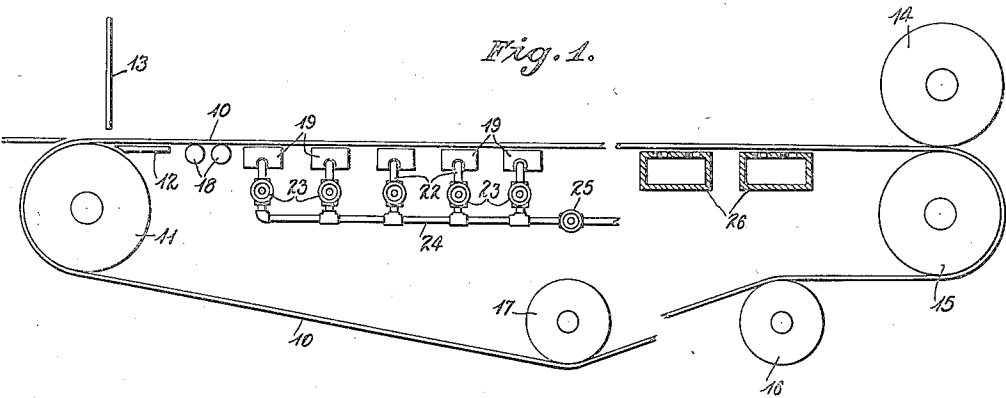


Fig. 2.

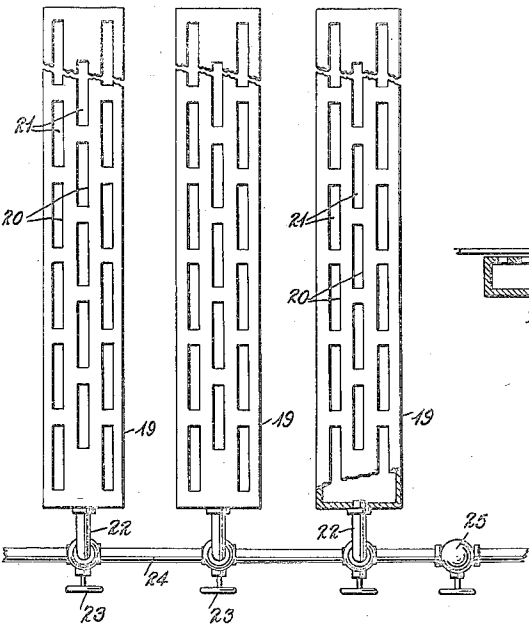
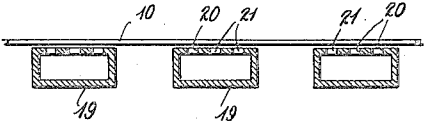


Fig. 3.



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PAPER MAKING MACHINE AND PROCESS

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The invention relates to paper making machines and a method carried out thereby and has as an object the provision of an improvement upon the invention described and claimed in my Patent No. 1,623,526 granted April 5, 1927.

In my patent referred to there is shown as a substitute for the usual tube rolls used with Fourdrinier machines, a series of bars providing edges for scraping or wiping the seepage from the under side of the Fourdrinier wire.

As described in the specification of that patent the devices there shown for this purpose provide a slight suction effect to draw water downwardly through the wire. It is found that this suction effect may be to some extent increased with advantage. According to the present invention there is substituted for the usual tube rolls or for a majority thereof, wiping means comprising suction boxes having desirably a very slight suction effect.

It is an object of the invention to provide an apparatus and a method whereby seepage is removed more effectively than by the method and apparatus shown in said former patent. An illustrative embodiment of an apparatus for this purpose and for carrying out the method is shown in the accompanying drawings wherein:—

Figure 1 is a diagrammatic side elevation of a Fourdrinier machine having the invention applied thereto;

Fig. 2 is a plan view partly broken away of the seepage removing means; and

Fig. 3 is a detail side elevation of a portion of the wire having the seepage removing means provided by the present invention shown in vertical transverse section.

As shown in Figure 1, the machine comprises a Fourdrinier wire 10, a breast roll 11, an apron 12, slice board 13, press rolls 14, 15, and idle rolls 16, 17.

It is found that closely adjacent the apron 12 it is desirable to use a small number, as two or three, of the usual tube rolls 18. Immediately adjacent the tube rolls 18, if any tube rolls be used, the devices of the present invention are placed in lieu of the bars shown

in the former patent referred to. According to the present invention these devices 19 are in the form of small suction boxes and the leading edge of each of these boxes as well as the edges 20 of the slits 21 in the boxes serve to remove seepage in the manner described in my patent referred to.

As shown the outlets of these boxes have applied thereto conduits 22, each provided with a valve 23, which conduits are shown as communicating with a common pipe 24 which desirably is provided with a valve 25.

To provide a mild suction effect upon the interior of members 19, the valves 23 may be kept closed until the boxes are filled with seepage or the boxes may be initially filled with water with the valves 23 closed when the machine is started.

When the machine is put into operation, the valves 23 may be opened to an extent to withdraw the seepage as it is received from the wire and since air cannot get access to the interior of the boxes except through the wire, pressure of air upon the upper side of the stock upon the wire will produce the effect of suction in gaining access to the interior of the boxes.

If desired the boxes may be controlled in multiple by means of a valve such as 25 or the suction effect may be graduated by the variation of the amount of opening of the valves 23 so as to produce a slightly greater suction effect upon each succeeding box over which the wire travels. By the control thus provided the suction effect upon the members 19 may be graduated from zero to any desirable amount and if desired some or all of these boxes may have positive suction induced therein in the same manner as the usual suction boxes shown at 26, Figure 1.

By virtue of the invention the seepage may be removed from the wire so effectively as to enable the wire to be run at a much higher speed than was possible with the tube rolls formerly used for removing seepage in the place of elements 19 and even with this increased speed an improved grade of paper may be produced as compared with the former practice of using tube rolls for removal of seepage.

It is found that when a small degree of suction is applied to the forming sheet upon the wire as provided by the apparatus and method of the invention, the air pressure upon the surface of the stock tends to seal the fibers together, slightly squeezing the water therefrom, which action combined with the method of wiping the seepage from the lower surface of the wire according to the method of my patent referred to causes a rapid and effectual sheet formation. Since no seepage is returned through the wire by centrifugal action of tube rolls a uniform sheet of high quality is produced. Moreover the present invention, by more effectually removing seepage and accelerating the seeping action enables the speed of the wire to be still further increased.

The suction effect upon successive boxes may be gradually increased by the apparatus disclosed, as the formation of the sheet progresses to provide a method securing the greatest advantage.

Minor changes may be made in the physical embodiment of the apparatus or in the steps of the method within the scope of the appended claims, without departing from the spirit of the invention.

I claim:

1. In a Fourdrinier paper making machine as a substitute for tube rolls thereof, in combination with the Fourdrinier wire, suction boxes located in the sheet forming portion of said wire having their upper corners facing toward said feed end located in the path of the film of seepage carried by the lower surface of the wire, said boxes arranged to leave open spaces therebetween and acting to wipe said seepage from the wire, and means to produce suction in said boxes.

2. In a Fourdrinier paper making machine as a substitute for tube rolls thereof, in combination with the Fourdrinier wire, suction boxes located in the sheet forming portion of said wire, said boxes having perforated tops, the upper corners of said boxes and the margins of said perforations facing said feed end located within the path of seepage carried by the lower surface of the wire and acting to wipe said seepage from the wire, and means to produce suction in said boxes.

3. In a Fourdrinier paper making machine as a substitute for tube rolls thereof, in combination with the Fourdrinier wire, suction boxes having longitudinally slotted tops, said boxes spaced apart and the first thereof located adjacent the feed end of the sheet forming portion of the wire, the upper corners of the boxes and the margins of said slots facing said feed end located in the path of the film of seepage carried by the lower surface of the wire and acting to wipe seepage therefrom.

4. In a Fourdrinier paper making machine as a substitute for tube rolls thereof, in com-

bination with the Fourdrinier wire, suction boxes located adjacent the feed end of the sheet forming portion of the wire and approaching the wire within the path of the layer of seepage upon the lower surface thereof, means to retain said boxes full of liquid during initiation of the operation of the wire and to allow the liquid to escape as seepage enters the same to cause a suction by atmospheric pressure.

5. In a paper making machine, in combination with a Fourdrinier wire as a substitute for usual tube rolls, a plurality of suction boxes located under the sheet forming portion of the wire adjacent the feed end thereof, means to individually maintain said boxes full of liquid during the starting of the machine and to individually control the outflow therefrom whereby to induce suction.

6. The process of making paper which comprises removing water from a moving film of pulp stock by suction while the film is in fluent condition upon a moving, water permeable non-absorbitive carrier, and the fibres of the stock are forming into a sheet, and wiping the water from the lower surface of the film carrier by stationary means placed in the path of the moving film of seepage.

7. The process of making paper which comprises removing water from a moving film of pulp stock by suction while the film is in fluent condition upon a moving, water permeable non-absorbitive carrier, and the fibres of the stock are forming into a sheet, progressively increasing the suction as the proportion of fibre to water increases, and wiping the water from the lower surface of the film carrier by stationary means placed in the path of the moving film of seepage.

8. The process of making paper which includes subjecting a film of stock upon a Fourdrinier wire to alternate suction and release from suction in the sheet-forming portion of the wire and removing seepage from the lower surface of the wire by alternately applied pure wiping action and combined wiping and suction action in the said sheet-forming portion of the wire.

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