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METHOD AND APPARATUS FOR MANUFACTURING PAPER
OR SIMILAR FIBROUS PRODUCT UTILIZING
STOCK-DEPOSITING SPRAY MEANS
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Fig. 1.

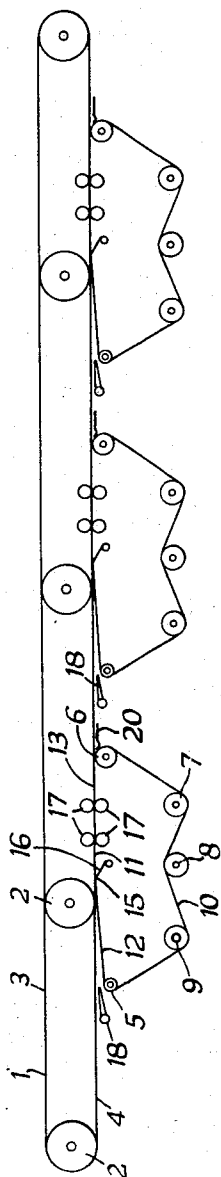
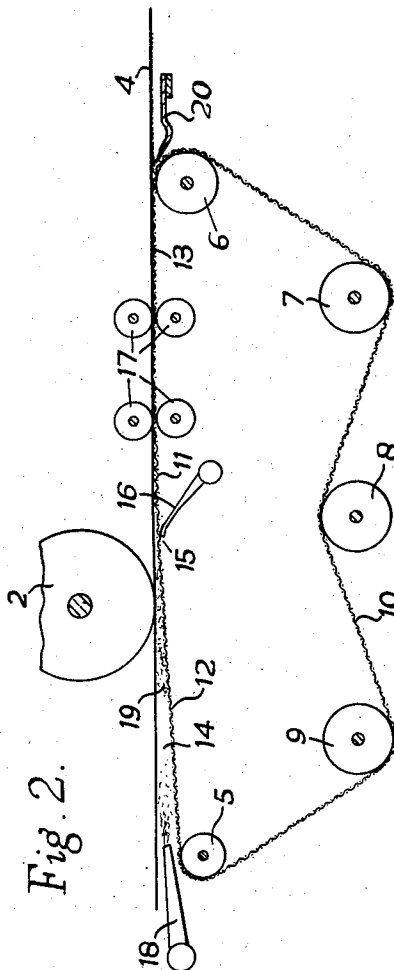


Fig. 2.



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METHOD AND APPARATUS FOR MANUFACTURING PAPER OR SIMILAR FIBROUS PRODUCT UTILIZING STOCK-DEPOSITING SPRAY MEANS

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5 Claims. (Cl. 92—44)

This invention relates to an improved method and apparatus for making paper or paper board or similar fibrous product.

It has been found that the initial separation of water from watery pulp can be facilitated by squeezing a layer thereof between opposed permeable members so that water is forced out of the watery pulp.

The object of the present invention is to provide improved method and apparatus for separating and removing water from watery pulp.

The present invention consists in a method of making paper, or paper board or similar fibrous product in which watery pulp for forming a web is sprayed into a throat provided by and between portions of co-operating upper and lower permeable bands and said bands include parallel portions that move with the pulp and carry it along between them, whereby the pulp is squeezed at the narrow end of the throat so as to separate water therefrom, said water passing through the lower band and being removed, so that the layer of pulp is formed downwardly on the lower band.

If desired the formed layer may be passed by the upper band into a throat provided by and between a portion of said band and a second co-operating lower permeable band that includes a portion parallel with the upper band, and watery pulp is sprayed on to the undersurface of the formed layer and said formed layer with the watery pulp is carried along between the upper and second bands whereby it is squeezed at the narrow end of the throat so as to separate water from the watery pulp, said water passing through said second lower band and being removed, whereby the layer of pulp is formed downwardly on the said lower band and combines with the formed layer to provide a multi-ply web.

The present invention also consists in a method for making paper, paper board or similar fibrous product in which watery pulp is sprayed on to the underside of a permeable carrier band and is squeezed between said band and a permeable member located below, whereby water is separated from the pulp and passes downwardly through said member and is removed, thereby forming the pulp and producing a single-ply web.

If desired the single-ply web may be carried by the band to a second permeable member located below the band where watery pulp is fed against said web, and the web and watery pulp is squeezed between said second permeable member and the band, whereby the watery pulp is formed and so a multi-ply web is produced.

The present invention also consists in apparatus for making paper, paper board or similar fibrous product comprising an upper permeable band arranged to move in a substantially horizontal path, a lower permeable band moving with the upper band and having a portion directed at an angle thereto to provide a tapering throat between the bands, and a portion parallel to the upper band, and means for spraying watery pulp into said throat through its open end, whereby movement of the bands acts to carry the pulp along through the narrow end of

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the throat where it is squeezed to separate water therefrom, said water passing through the lower band and being removed whereby the layer of pulp is formed on said lower band, and means for directing said formed layer on to the upper band.

If desired a second lower permeable band may be arranged to provide a second tapering throat in conjunction with the upper band and means provided to spray watery pulp on to the formed layer carried by the upper band as it passes through said second throat, whereby movement of the bands acts to carry the formed layer and watery pulp along between the upper and second bands so as to squeeze the pulp and separate water therefrom, said water passing through the said second band and being removed whereby a multi-ply web is produced.

Apparatus for carrying out the method of the present invention is diagrammatically indicated in the accompanying drawings in which:

Fig. 1 shows a multi-ply machine and Fig. 2 shows one section of the machine of Fig. 1, drawn to a larger scale.

The mechanism comprises a main permeable endless travelling carrier band 1 running around rollers 2 so as to provide top and bottom substantially parallel horizontal runs 3, 4.

Below the bottom run 4 there is mounted on suitable guide rollers 5 to 9 a short endless wire cloth band 10, said band being arranged to move in a substantially rectangular track with an upper horizontal run 11 adapted to co-operate with the main endless band 1.

The said upper horizontal run comprises two sections, one (12) at a slight angle, say 3°, to the bottom run 4 of the main band, and the other section, 13, is parallel to said bottom run. By this arrangement a tapering throat 14 is provided between said bottom run 4 and the section 12, the narrow end 15 of said throat being defined by a slice 16 that acts to nip the two bands together. Press rollers 17 are rotatably mounted above and below the co-operating parallel runs 13 to press the two bands tightly together and so squeeze the pulp travelling through with the bands.

The number of short endless wire cloth bands 10 corresponds with number of plies in a completed web, thus there is one short band for each ply. Three short bands 10 are shown in the Fig. 1.

For each band, there is also provided a narrow mouthed slice 18 for spraying pulp in between the bands. Thus in front of each tapering throat 14 there is secured a suitable slice 18 adapted to spray watery pulp into the throat from which position it is carried by the co-operating converging bands 4, 12, past the slice 16 that nips the bands together into the parallel section 13 of the two bands.

The operation of the apparatus is as follows:

The narrow mouthed slices 18 are connected to the pulp supply and the main travelling band 1 is set in motion. This frictionally drives the short endless bands 10.

A supply of watery pulp then issues from each of the slices 18 into the tapering throats 14 so that a pond 19 of pulp is entrained by the co-operating bands and carried towards the parallel section 13 of the bands.

Some water starts to pass through the sloping section of the short band and falls to a pit as waste or for re-use. As soon, however, as the pulp passes the slice 16 into the parallel section 13, as a considerable squeezing action is exerted at said slice, then a considerable quantity of water is forced out of and separated from the watery pulp so that it starts to form; this water passes through the band 10 and falls to a pit or drain.

After passing the pressing rollers 17 hereinbefore

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referred to, where more pressure is exerted, the pulp is formed to a sufficient extent for the resultant web to be removed from the band 10. For this purpose a guide plate 20 is provided for each band 10 and this acts to peel the formed web from said band and guide it on to the under-surface of the travelling band 1.

The web is then carried by the said main band 1 to the next short endless band 10 where more pulp is sprayed from below on to the formed layer, and this pulp is dewatered in a similar manner to the first layer. It also integrates with said first layer to provide a two-ply web.

A third ply may be added at the third short endless band in a similar manner.

Finally the web passes through the usual drying cylinders to complete the manufacture of the board.

I claim:

1. A method of making multi-ply fibrous web material which comprises spraying watery fibrous pulp into a first tapering throat between the bottom run of an elongated top forming wire and the top run of a first bottom forming wire, advancing the wires in the same direction to move the pulp therewith to the narrow end of the tapering throat, draining water from the throat through the bottom wire, squeezing the wires together at the terminal end of said throat to drain more water from the pulp and form a web between the wires, transferring the web to the bottom run of the top wire, uncovering the bottom face of the web, spraying watery fibrous pulp into a second tapering throat between and against the uncovered bottom face of the web and the top run of a second bottom forming wire, advancing the second bottom forming wire with the web and top forming wire, draining water from the second throat through the second bottom forming wire, squeezing the top wire and the second bottom wire together at the terminal end of the second throat to drain more water from the pulp and form a second web on the bottom face of the first web, transferring the thus formed multi-ply web to the bottom run of the top wire, and uncovering the bottom face of the multi-ply web.

2. A method of making multi-ply paper or board which comprises spraying watery paper pulp into a plurality of tapering throats between the bottom run of a top forming wire and the top runs of a plurality of bottom forming wires at spaced intervals along the bottom run of the top wire to deposit pulp on the bottom run of the top wire in the first throat and in each successive throat to deposit pulp on the bottom face of the previously formed web carried by the bottom run of the top wire, draining water from the paper pulp through the bottom wires as the pulp travels toward the narrow ends of said tapering throats, squeezing the pulp between the wires beyond the narrow ends of the tapering throats to form webs between the wires, transferring the successively formed webs to the bottom run of the top wire to successively unite the newly formed webs, and uncovering the bottom face of each successive web to thereby form a multi-ply web on the bottom run of the top wire which has the plies thereof integrally united through interlocking of the pulp fibers in the successive throats.

3. An apparatus for making fibrous material which comprises a looped top forming wire having a bottom

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forming run, a bottom looped forming wire having a top forming run, means directing said wires to form a tapered forming gap therebetween, a slice in the loop of the bottom wire pressing the top run of the bottom wire against the bottom run of the top wire at the convergent end of said gap, means pressing said wires together beyond said slice, means directing the top run of the bottom wire away from the top wire at a point downstream from said pressing means, means for spraying watery pulp into the large end of said tapered gap, means for driving the wires to move the bottom run of the top wire and the top run of the bottom wire in the same direction for pulling the pulp into the throat while simultaneously draining water therefrom to form a web from the fibrous material of the pulp, and means releasing the web from the top run of the bottom wire to travel with the top wire beyond the point where said means directs the top run of the bottom wire away from the top wire.

4. An apparatus for the manufacture of a multi-ply web of paper web or paper board material which comprises an elongated looped forming wire having a substantially horizontal bottom forming run, a plurality of shorter looped bottom forming wires each having a top forming run successively spaced along the length of the bottom run of the top wire, means in the loop of each bottom wire directing the top runs thereof to form tapered gaps with the bottom run of the top wire, means pressing the wires together at and beyond the convergent ends of said gaps, means for spraying web forming pulp into each of said gaps to be formed into a first web in the first gap and to build up additional webs on the first web, and means for transferring the webs to the bottom run of the top wire.

5. An apparatus for the manufacture of a multi-ply web of paper or paper board comprising an elongated travelling looped permeable upper band having a substantially horizontal bottom run, a series of endless looped wire bands arranged beneath the travelling band and moving therewith, each of said wire looped bands having a top run with a section inclined at an angle to the bottom run of the upper band and a section parallel thereto, so as to provide a plurality of tapering gaps, a slice in the loop of each wire band urging the top runs thereof against the bottom run of the upper band to define the junction between each inclined and parallel section and hence the narrow end of each gap, means at the end of each parallel section remote from said junction for guiding a formed web from each lower wire on to the upper band, means for spraying watery pulp into each tapering gap, and means for removing water from the pulp at each said junction so that a formed web passes along each parallel section.

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