Aug. 1, 1972 E. A. NYKOPP 3,681,193

APPARATUS FOR PRODUCING SEPARATE PAPER WEBS AND COMBINING THEM ON A COMMON POROUS BELT

Filed Feb. 20 1970

2 Sheets-Sheet 1

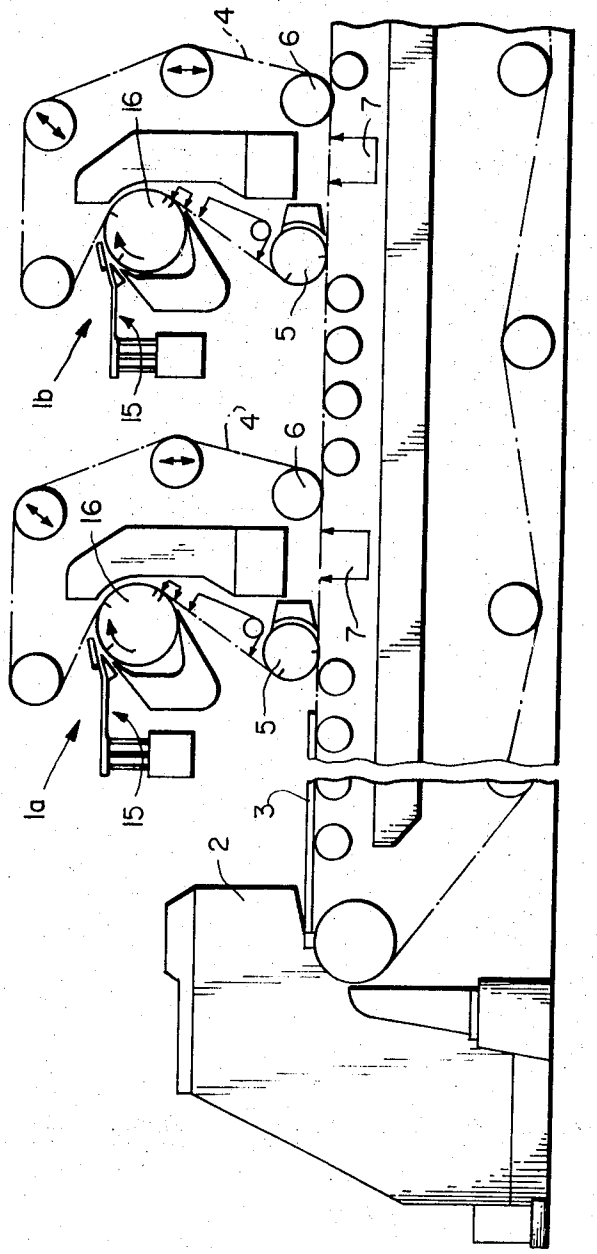

FIG. 1

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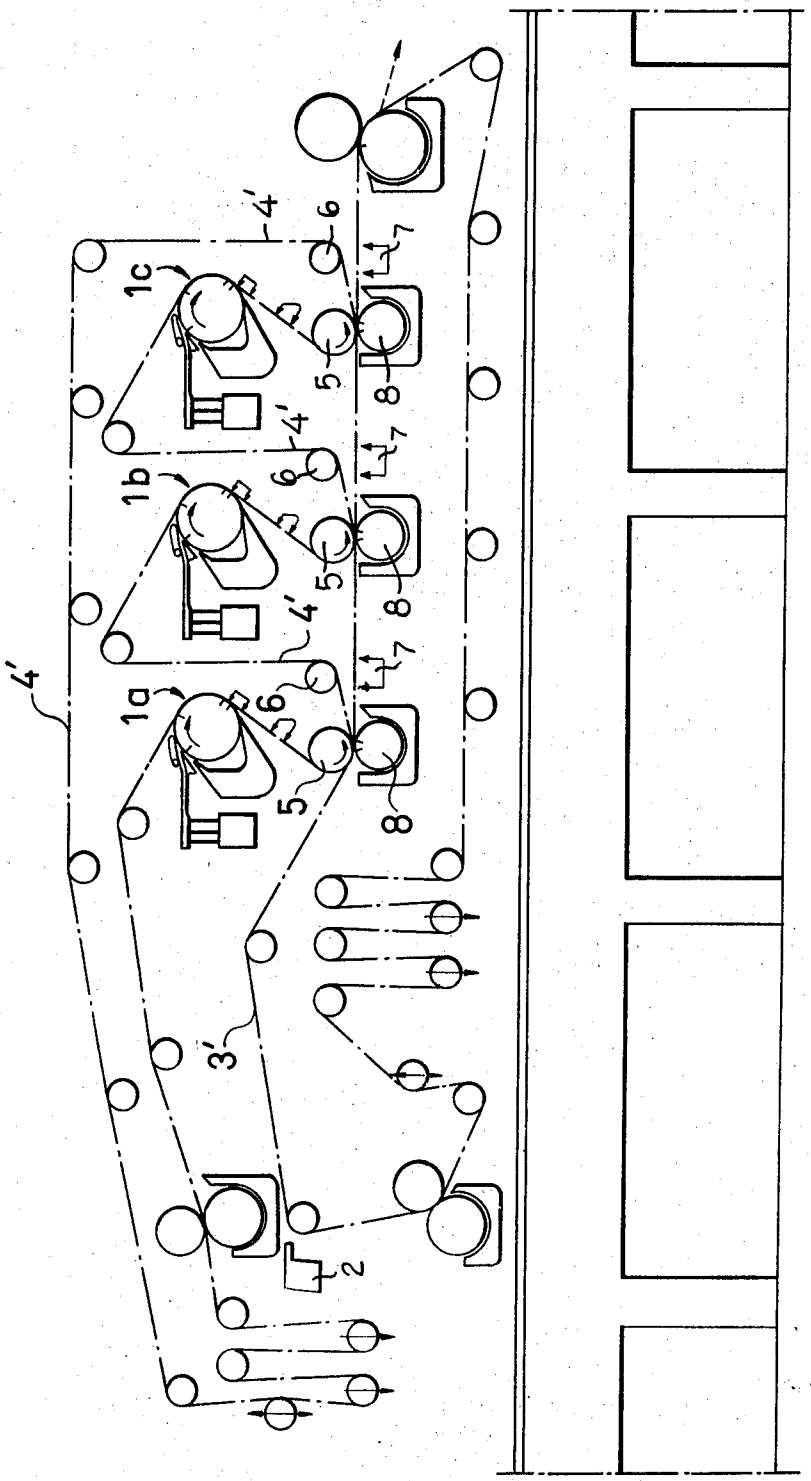

Fig. 2

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APPARATUS FOR PRODUCING SEPARATE PAPER WEBS AND COMBINING THEM ON A COMMON POROUS BELT

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U.S. Cl. 162—304 3 Claims

ABSTRACT OF THE DISCLOSURE

A compound paper machine system for producing multi-layered paper webs which includes several web forming units and a common endless lower wire or felt therebeneath on which the individual webs are deposited. Each web forming unit may comprise a forming cylinder on which slurry is deposited from a headbox and a separate endless wire or felt which laps part of the upper surface of each cylinder and which is guided so as to deposit the individually formed webs onto the common endless lower wire or felt. Optionally the separate lapping wires or felts for each unit can be a single porous belt.

BACKGROUND OF THE INVENTION

Field of the invention

The invention relates to a compound paper machine, and in particular to one for continuously manufacturing by layers either thick cardboard, paper or the like.

Description of the prior art

A compound paper machine has been proposed in which the felt or wire is carried from the first machine to the feed roll of the next machine. From this second machine, the wire or felt is carried further to the third machine, etc., and in which the felt or wire is returned from the last machine to the feed roll of the first machine. The web is detached from the wire or felt and conveyed to further treatment prior to returning the wire or felt to the feed roll of the first machine.

A great drawback of a compound paper machine of this type is that the drying of the web becomes increasingly difficult as the thickness of the web increases. Each new layer is wet, and when it is combined with the web which has already been partly dried it is obvious that the latter will absorb part of the moisture contained in the wet, additional layer. It is a difficult task to dry such a thick web, and it poses at least much greater difficulties than would be encountered if the greater part of the water in each layer were removed before its combination with the other web.

SUMMARY OF THE INVENTION

According to the invention there is positioned under each web-forming unit a common endless lower wire or felt for the purpose of receiving and combining the webs.

The first web-forming unit may be a headbox arranged to feed slurry onto the horizontal initial part of the lower wire or felt. This initial part is preferably provided with dewatering means placed before the cylinder machine units.

The present invention affords a compound paper machine in which each layer is partly dried before its combination with the web and in which dewatering of each layer takes place in two different directions, so that the fiber distribution in each layer is controllable. With a device according to the invention it is possible to manufacture thick paper, cardboard or the like in a continuous process by layers at higher speeds and with higher basis weights in each layer than before. At the same time, a considerable advantage is achieved in that the O-waters of different layers are mutually mixed to a lesser degree because the layers are combined in dryer condition than before. O-water is understood to be the water which is removed from the web and which contains short fibers.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a schematical elevational view of one embodiment of a paper machine according to the invention in which the first web-forming unit consists of a headbox, and

FIG. 2 shows a schematical elevational view of another embodiment of a paper machine according to the invention in which each web-forming unit is a cylinder paper machine connected by a single, endless porous belt.

For the sake of clarity the complete frame of the paper machine has not been shown in the drawings but it should be understood that the web-forming units and the rolls are mounted in this frame.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the embodiment shown by FIG. 1 two cylinder machine units, the units themselves belonging to the prior art, **1***a* and **1***b* have been placed in a substantially horizontal plane, one after the other at a distance from each other and above the substantially horizontal lower wire or endless porous lower belt **3**. The cylinder machine units each have a headbox shown generally as **15**, for feeding slurry unto the ascending surface of the horizontal suction cylinder **16**. Each of the two cylinder machine units has been provided with a separate wire or felt **4** arranged to lap part of the surface of the respective cylinders and which wire or felt has been arranged with the aid of the rolls **6** and **5** to be urged against the lower wire **3**, for the purpose of combining the layers between this latter wire and the felt **4**. Positioned below each of the cylinder machine units **1***a* and **1***b* is a suction box **7**. Each suction box **7** is positioned below the lower belt **3** at a point along the lower belt **3** which is somewhat removed from the point of contact of the web upon the continuous belt **4**. Each suction box **7** serves to remove water from the web on the lower belt **3**.

At the leading end of the horizontal, endless lower wire **3** a headbox **2** has been mounted, which feeds the first slurry layer onto the lower wire **3**. Part of the water in the first slurry layer has already escaped before the first cylinder machine **1***a*. Dewatering of the slurry to form a web on the lower wire is accomplished by gravity effect and/or with the aid of special suction boxes **7** or other dewatering elements of previously known type.

The web is picked off from the lower wire at some appropriate point after the cylinder machine unit **1***b* and it is conveyed to other machines for further treatment.

In the embodiment shown in FIG. 2, three cylinder machines **1***a*–**1***c*, in themselves belonging to the prior art, have been placed in a substantially horizontal plane one after the other at a distance from each other, and under them a common, endless porous belt or lower felt **3'** has been placed. In this embodiment the lower felt **3'** is returned with the aid of an appropriate number of rolls from the last to the first cylinder machine.

As distinguished from the arrangement in the embodiment shown in FIG. 1, in the embodiment, each cylinder machine unit has been provided with an endless porous belt such as a common wire or felt **4'**, which, with the aid of the roll **5**, is urged against the upper surface of the lower felt **3'**. Under the roll **5** another roll **8** has been provided, the rolls **5** and **8** together constituting a pair of press rolls. Between the rolls **5** and **6**, against the under-

side of the lower felt, there may also be a suction box **7**, which is helpful in combining the layers and in transferring the layer onto the lower felt. The common felt **4'** is returned from the last cylinder machine **1***c* to the first cylinder machine **1***a* with a suitable number of tension and guide rolls.

This embodiment provides the additional advantage of a more reliable operation as compared to the first embodiment having separate wires or felts **4**. The common extended felt **4'** is subjected to less stresses than the relatively short separate wires or felts **4**. Moreover, the wear of the extended common felt **4'** is more even and less rolls are required to guide it than when separate wires or felts **4** are used. Using a common felt **4'** means not only more reliable operation and longer maintenance free periods but also a less expensive and more economical construction.

Instead of cylinder machines, it is also possible to use one or several slurry feed boxes placed above the lower wire or felt, from which slurry is directly fed onto the lower wire or felt. In a compound paper machine according to the invention also other kinds of ancillary equipment in themselves belonging to prior art may be employed.

What is claimed is:

1. An improved compound paper machine for continuously manufacturing, in layers, thick paper webs from slurries comprising:

at least two web-forming cylinder machine units, each cylinder machine unit comprising a horizontal suction cylinder, a headbox positioned to feed slurry upon the ascending upper surface of said horizontal cylinder, and an endless porous belt positioned to lap part of the surface of said horizontal suction cylinder and to hold said slurry against the surface of said horizoital suction cylinder;

each cylinder machine unit being positioned in a spatial relation to the other machine units and above an endless porous lower belt, said lower belt being movable at the same speed as each endless porous belt, each endless belt being positioned to permit a web thereon to be deposited upon said lower belt; and

a plurality of suction boxes positioned beneath the endless porous lower belt in spatial relation to each other,

each suction box being positioned juxtaposed to the contact point between the web upon each endless porous belt and the lower belt, wherein the endless porous belt of each cylinder machine unit is comprised of a single endless porous belt interconnecting all said cylinder machine units, said endless porous belt contacting said lower belt at noncontiguous regions.

2. The improved compound paper machine of claim **1** additionally comprising:

a headbox for depositing slurry directly upon said endless porous lower belt permitting said cylinder machine units to deposit webs upon the web formed on said lower belt.

3. The improved compound paper machine of claim **1** additionally comprising a pair of rolls for each cylinder machine unit, said rolls being positioned to form a press nip therebetween, each pair being positioned below each respective cylinder machine unit, each said pair of press rolls having said lower belt pass through each respective press nip and having each respective endless porous belts of said cylinder machine units pass through the single press nip of the pair of rolls positioned below each respective cylinder unit.

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