Nov. 14, 1967 M. KROFTA 3,352,748

APPARATUS FOR PRODUCING WEBS OF FIBROUS MATERIALS, IN PARTICULAR OF PAPER AND CARDBOARD WEBS

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FIG. 1.

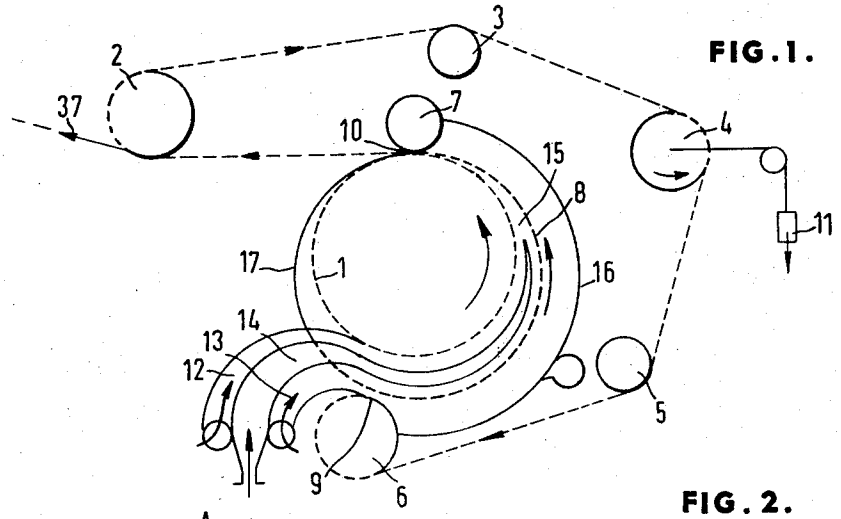



FIG. 2.

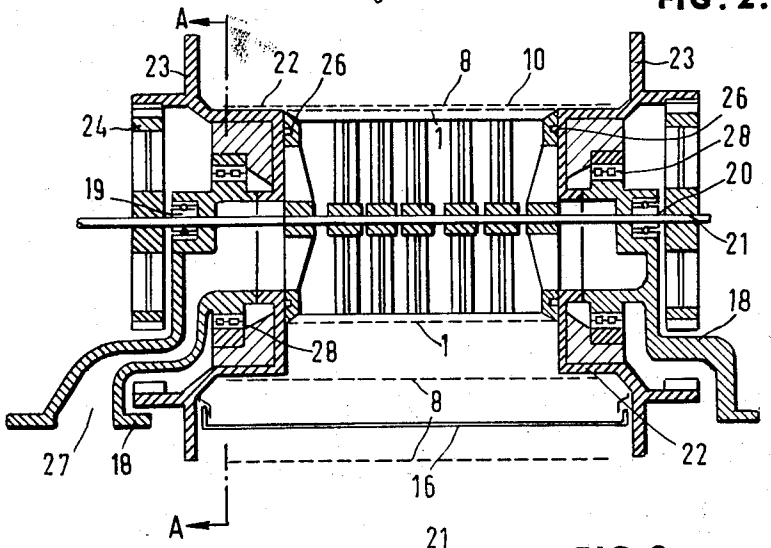
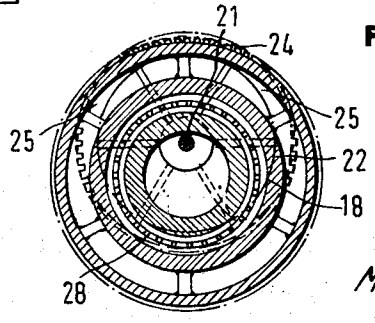



FIG. 3.




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FIG. 4.

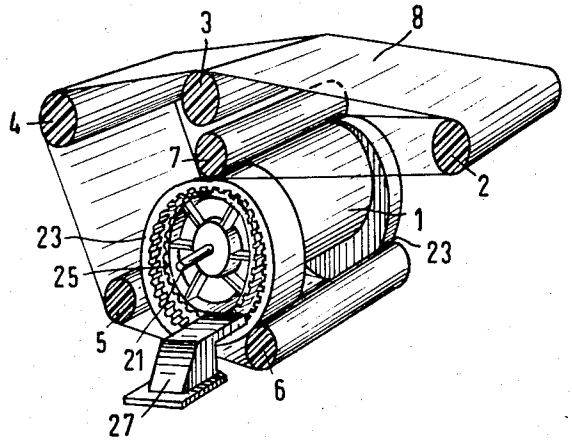
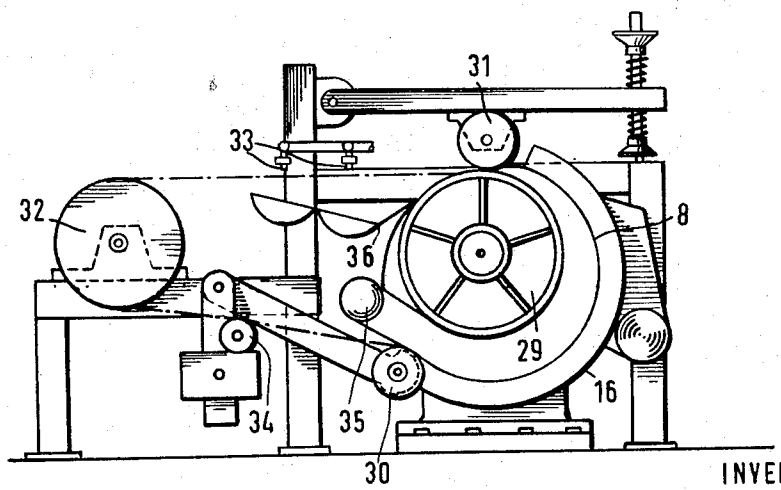



FIG. 5.




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3,352,748

# APPARATUS FOR PRODUCING WEBS OF FIBROUS MATERIALS, IN PARTICULAR OF PAPER AND CARDBOARD WEBS

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2 Claims. (Cl. 162—318)

Known longitudinal and round screen machines for manufacturing paper and cardboard webs are not provided with effective side seals for the web edges. The production of webs can therefore be effected only under relatively low pressures in the sheet forming zone. Furthermore, the speed of the sheet formation is low. This speed can be increased somewhat, however, when the sheet formation takes place on two movable screen conveyors which converge to a narrow gap, where both sheet webs are joined into a single sheet. Even in this case it is not possible to employ a higher pressure because of the difficulty of removing the webs by means of carrying rolls or cylinders because of the lack of lateral sealing

The invention overcomes this shortcoming of known papermaking machines, particularly cardboard making machines in which the sheets are formed between two pulp conveyor belts moving simultaneously in the same direction and where both webs finally form a unitary sheet.

The invention makes it possible to overlay the fiber on the screen conveyors with a desired high pressure i.e. with pressure limited by the resistance ability of the screen web, while for the first time a lateral sealing of the space between both screen webs is achieved. This makes it possible to introduce additionally in the space between both screen webs media which are under pressure, so that additional drainage is made possible through pressure filtration, and the travel speed and thus the speed of production of paper or cardboard webs are substantially increased.

These advantages are achieved according to the invenvention by constructing the inwardly disposed screen conveyor as a cylinder supported on both ends and closed at its forward end and the outer screen conveyor as an endless band guided on rolls, said band partly surrounding the cylinder and spaced from the latter in the form of an arc of at least 100° and held on both sides by carrying members which enclose the space between the cylinder and the outer screen conveyor on both sides. The two sheet webs which are guided to converge in a small gap to form a common sheet are removed, dried in a known manner, and bleached or manipulated in various ways. Devices for collecting and conducting away the water escaping from the reverse side of the fiber webs are provided at the apparatus according to the invention.

Advantageously the supply of the fluid fiber pulp is affected by means of two supply channels, each of which abuts the screen cylinder and the screen belt and is separated from the other by curved wall. This wall may be adjustably arranged at predetermined distances from the upper surfaces of the screen cylinder and/or the screen belt, traveling about it together, or adjacent part surfaces thereof. It is thus possible to subject the fiber pulp to a hydraulic pressure of a hydraulic pressure head of 1 to 10 meters. At the same time the speed of conveying is high, so that the centrifugal forces about the outer screen belt assist the formation of the fiber web and do not counteract this formation, as is the case in the manufacture of paper on round screens. The converging of both conveyor means to a narrow gap, the size of which is adjustable, assists the desired pressing of the produced fiber web and makes it possible to vary the thickness of the web within comparatively extensive limits.



Above all, supplying two separate fiber streams under pressure assists the pressing out of the deposited sheets before their emergence from the gap. This separate supply makes it further possible to achieve, during production, various characteristics or properties in the two converging sheets brought together at the end portion of the apparatus. Basically, the uniformity of the manufactured paper is improved by providing a fiber web consisting of two sheets, apparently since the loose fleece portions of one sheet come in contact with portions of the other superimposed sheet which have a more compact fleece structure. It is possible to produce, for example, paper with different colors on both sides by using different fiber web color layers. It is possible in particular to produce comparatively strong papers similar to cardboard. It should be noted further that absorption paper webs may be produced having solid compact upper surfaces and an underside having other properties. It is possible, for example, to superimpose over a fleece paper sheet a cover to which fine seeds and fertilizer are added in powder form. Such webs can be spread out on the ground and produce a seeding of the latter under atmospheric influences, particularly rain.

As a further development of the dividing wall between the two fiber streams the former can also be formed as a narrow channel for supplying gaseous media or substances, such as compressed air or steam, whereby the narrow outlet slot opens into the upper third of the space between the screen cylinder and the screen conveyor. Various media under pressure such as compressed air can be introduced into this channel so that the compression of the fabricated fiber layers may be extended considerably, thus obviating at least partly the usual aspiration cylinders for removing water from the fiber layers. This increased draining of both layers makes it possible to influence the web structure before it is joined. The shaft provided at the point where both layers join as a common web, is adjustable for changing the slot or gap width and for varying the pressure. It can likewise be disposed in the hollow interior under low pressure and extract water from the fiber web. In order to adapt the assembled drive of the screen conveyor and its tensioning spool for different work surfaces and conditions there may be provided at least one shaft on which the screen conveyor is adjustably mounted and is under the influence of an auxiliary force, e.g. a tension weight. The speed of rotation of the screen drum and of the screen conveyor are adapted to the operating conditions, the consistency of the fiber mixture and the quality of the fiber web which it is desired to produce.

Further details of the invention are explained in the drawing which illustrates two embodiment examples.

In the drawing:

FIG. 1 is a schematic representation of a paper or cardboard making machine with two screen conveyors,

FIG. 2 is a longitudinal section of the embodiment of the machine shown in FIG. 1,

FIG. 3 is a cross-section taken on line A—A of FIG. 2,

FIG. 4 is a perspective view on a smaller scale of the embodiment according to FIGS. 2 and 3 and

FIG. 5 is a side view of a machine with only one screen conveyor.

In the double screen machine according to FIGS. 1–4, an endless metallic screen belt **8** is guided about a metal screen cylinder **1** over rolls **2**, **3**, **4**, **5**, **6** and **7** in such a manner that during the operation of both screen devices they rotate in the same direction, shown by the arrows in FIG. 1. The screen belt moves at **9** into an arcuate part arranged about the upper surface of the metal screen cylinder **1** and approaches, at **10**, a narrow gap, the size of which may be adjusted by a correspond-

ing adjustment of roll **7**. The tension of the screen belt is effected by means of roll **4**, which may be regulated by an auxiliary force, shown as a weight **11** in FIG. 1.

The fiber material mixture is delivered under a pressure of, e.g., of one atmosphere through the channels **12** and **13** through the entire width of the gap or slot between the metal screen cylinder and the screen conveyor. These are separated from one another by an intermediate channel **14** extending up to the swingable and adjustable outlet opening **15** in the upper third of the space between the belt and the cylinder which would be on arcuate path of at least 66°. Suitable media such as cold and warm compressed air or hot steam may be introduced in this channel. The entire unit is enclosed in a housing from which extend both the cover and water collection shell **16** for the working part of the screen conveyor and the cover **17** of the free upper surface of the metal screen cylinder.

FIGS. 2, 3 and 4 illustrate the construction details of the above embodiment. The metal screen cylinder **1** has a reinforced interior and is constructed as a hollow body, in known manner. The cylinder is mounted in the support frames **18** at **19** and at **20**, with its shaft **21** connected to a drive (not shown). As shown in FIGS. 1 and 3, the screen cylinder **1** and imperforate cylindrical portions **22** are in an eccentric relationship with each other.

The screen belt **8** is led from line **9** to line **10**, as shown in FIG. 1, over both end surfaces **22** of the carrying member **23** of the metal screen cylinder **1**. These ends are rotatably supported by means of a ball bearing support **28** at the support frames **18**. Both support members **23** are driven by means of an inner gear **24**, mounted on the left carrying member with which an outer gear **25**, rigidly secured to the metal screen cylinder shaft **21**, is in meshing engagement. Thus the operational movements of both screens are effected by a single drive. The transfer of the rotational movement to the screen **8** around the cylinder surfaces **22** is effected through suitable construction of the outer surfaces of the cylinder surfaces, for example through a frictional connection, so that the required synchronization between the metal screen cylinder and the screen belt is assured. Seals arranged in slot **26** at the metal screen cylinder **1** assure a sealing of its inner frame against the similarly displaceable carrying member **23** and thus against the screen belt. The water discharged from this belt to the rear is caught in shell **16** and is led away. The water from the metal cylinder **1** emerges from a channel **27** in the support frame **18**. A similar water discharge channel may be readily provided at the other side of the metal cylinder.

The above described paper machine described operates as follows:

After the drive is connected, the metal screen cylinder **1** and the metallic screen belt **8**, rotate in the direction of the arrows shown in FIG. 1. A thinned out paper mixture is supplied through both channels **12** and **13** under a certain pressure, of, e.g., 1 atmosphere. The paper mixture entering through channel **13** settles on the screen **8** due to the discharge of water towards the shell **16**; the paper pulp from channel **12**, on the other hand, settles on the outer surface of the metal screen cylinder **1**. On each of these screens **8** and **1** there is simultaneously formed a paper web which converges at the narrow point **10** and the webs are pressed together into a common layer under the influence of roll **7**.

This paper layer is then carried on the conveyor **37** and thence to the usual apparatus for drying and manipulation (not shown).



Both paper pulp streams are kept separate from one another by the walls of channels **14**.

The water is squeezed out by suitable media, such as for example compressed air. The shafts **7**, which determine the width of the opening and thus the size of the layers of the paper web, may be provided on its outer cover with a number of passage openings or the like devices, through which water may be aspirated from the paper web. It will be obvious that many embodiments are possible and that the embodiment example serves only to illustrate the function of the paper machine according to the invention. Therefore the supply channels **12** and **13**, the dividing channel **14**, the housing **17** and the water receiving shell **16** are not shown in FIG. 4.

The embodiment according to FIGURE 5 is intended to serve as a thickener. At the same time it is simpler and is provided with an exteriorly closed cylinder **29** instead of a screen cylinder. The outer rotatable screen conveyor **8** in the modified embodiment is guided by means of rolls **30**, **31**, **32**, and **34**. Roll **31** as well as roll **7** of the described paper machine is mounted in an adjustable manner, so that the size of the discharge slot of the thickened fiber material web may be regulated or controlled. The water receiving shell behind the screen is indicated by the numeral **16**. The fiber material being discharged from under the roll **31** is manipulated in a known manner (not shown), e.g., into lumps which may be conducted to another fiber material floatation deposit.

Numeral **33** illustrates spray nozzles which clean the rotatable screen conveyor **8** after the fiber material web is carried out from the adjoining fiber material positions or rests.

The supply of the fiber material mixture is effected under pressure at **35** and the discharge of the thickened and pressed out material at **36**.

What I claim is:

**1.** Apparatus for producing webs of fibrous materials, in particular of paper and cardboard webs, comprising a support member, a hollow metal screen cylinder rotatably mounted on said support member and having cylindrical imperforate end portions in an eccentric relationship with said cylinder, an endless screen belt in an arcuate path of at least 100° relative to said screen cylinder and converging to a narrow gap therebetween and means for supplying fibrous mixtures to said cylinder and to said screen belt respectively, said means comprising a pair of spaced curved converging channel members, the walls of said channel members forming a chamber therebetween for supplying gaseous pressure medium, said chamber extending an arcuate path of at least 66° between the cylinder and the screen belt and having an outlet opening for gas.

**2.** Apparatus according to claim **1**, further provided with a water receiving and deflecting shell and spaced sideways of said channel members.


**References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 1,672,249 | 6/1928 | Ellis | 162—303 X |
| 2,473,269 | 6/1949 | Adams | 162—295 |
| 3,056,719 | 10/1962 | Webster | 162—318 X |

FOREIGN PATENTS

| | | |
|---|---|---|
| 1,297,048 | 5/1962 | France. |


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