

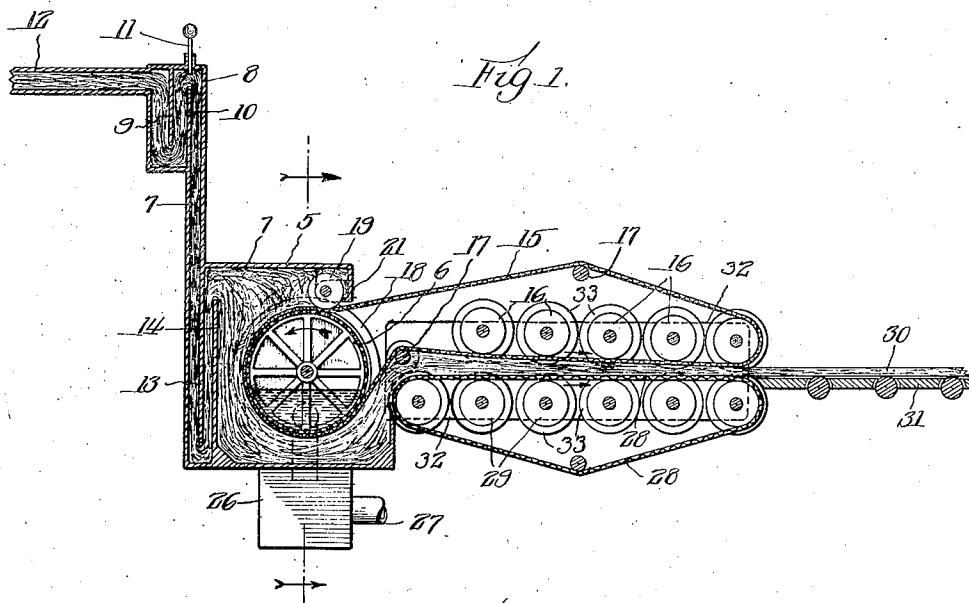
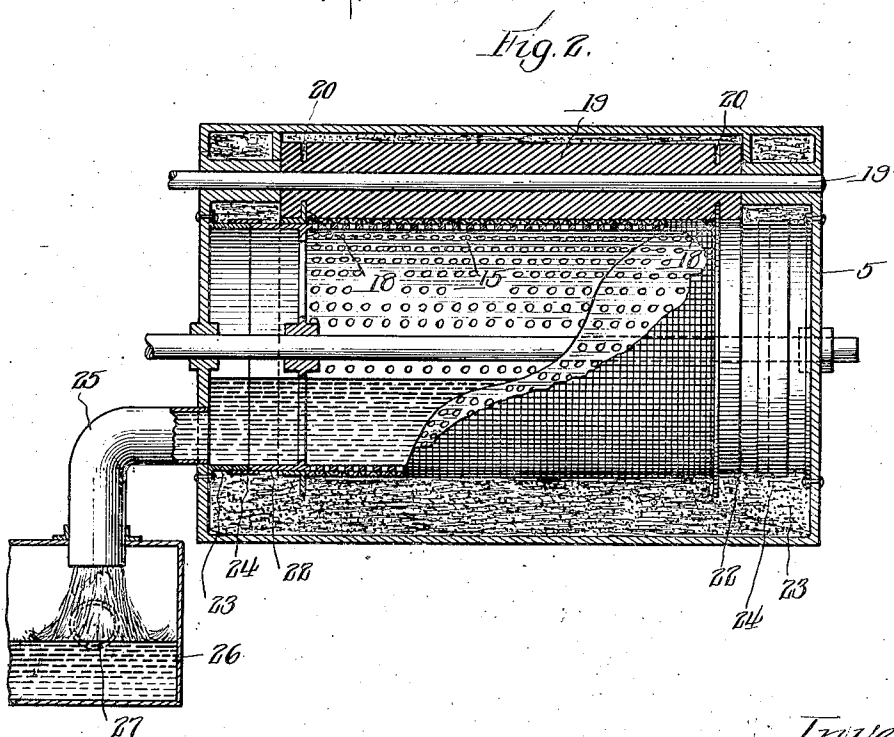
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APPARATUS FOR FORMING FIBROUS SHEET MATERIAL

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APPARATUS FOR FORMING FIBROUS SHEET MATERIAL.

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This invention relates in general to the provision of an apparatus for forming a continuous sheet of fibrous material and to the process of forming a fibrous sheet material under a substantial head or pressure.

In the ordinary method of forming sheet material, a continuous screen or belt travels through a vat containing fibrous material which is received upon the screen, and the surplus liquid removed therefrom by drainage, pressure or drying, the result being a thin continuous sheet of the fibrous material. The present invention differs from this process in providing a relatively thicker sheet of coarse fibrous material, both in the initial stage of depositing the fibrous material upon the screen and as a finished product, the result contemplated being a fibrous insulating felt or board of substantial thickness, depending upon the use for which it is intended.

A principal object of the invention is in the provision of a forming vat to which pulp under considerable head or pressure may be applied without loss of the pulp by leakage.

A further important object of the invention is in the provision of a forming vat with a continuous screen passing into and out of the vat and having a substantially fluid-tight closure for the screen at the inlet thereof. A further important object of the invention is in the provision of a fibrous sheet former, and the process employed for making a comparatively thick sheet out of a coarse fibre under pressure.

Other objects will appear hereinafter.

In the drawing,

Figure 1 is a sectional view illustrating an apparatus constructed in accordance with the principles of this invention, and

Figure 2 is a cross section taken through the forming cylinder.

This invention relates more particularly to the formation of a comparatively thick felt or sheet of insulating material made of coarse fibres, both long and short, felted together in a thick mass under considerable pressure in the forming vat.

Referring now more particularly to the drawing, a forming vat is designated generally with the reference numeral 5 and may be of any desired size or shape, sufficient to contain a forming cylinder 6 of considerable size. This vat is adapted to receive pulp 7 of suitable mixed long and short fibres from

a pressure box 8 represented as having baffles 9 and 10, a controlling valve or gate 11, and a pipe 12 leading from some suitable source of supply. Pulp is admitted from the pressure box to the vat 5 through a more or less tortuous passage formed by baffles 13 and 14.

A continuous screen or foraminated belt 15 extends over the forming cylinder 6 within the vat 5 and passes under a number of forming rollers 16 and over idlers 17 which guide it in its path outside of the vat.

Extending from the cylinder 6 at the edges of the screen 15 are flanges 18 for holding the screen in place and also for forming a substantially pulp-tight closure for the vat in connection with a flexible roller 19 mounted on a shaft 19' and pivoted in the ends of the vat. The roller 19 has grooves 20 at the ends into which the flanges extend, the vat being formed with an inwardly extending edge 21 for engaging the surface of the roller and preventing the escape of pulp from the vat. Preferably, the extending edge 21 which contacts with the roller 19 is on the outer side of the roller so that the roller itself is substantially enclosed, affording but little opportunity for leakage of pulp from the vat and even if a certain amount does leak through between the roller and the contacting edge 21, it will drip upon the screen 15 at its point of entry, which will cause no substantial loss of the pulp.

The body of the cylinder 6 is also of foraminated material, except at the ends 22 thereof, which are opposite shells 23 extending from the end walls of the forming vat and having a deckle band 24, making a substantially fluid-tight connection therebetween so that a fluid discharge pipe 25 may be connected at one end of the vat for communicating with the interior of the cylinder 6 and for withdrawing the more liquid content of the pulp from the inside of the cylinder, thereby further increasing the pressure difference between the inside and outside of the cylinder caused by the elevated pressure box 8. This pipe 25 discharges into a suitable box or receptacle 26 from which the liquid is pumped through a pipe 27 and discharged or reused in the pumping operation.

In order to form the board or sheet of pulped material, an endless belt or screen 28 is disposed outwardly from the forming vat, making a tight connection with the vat and

being carried upon rollers 29 disposed below the pressure roller 16 of the screen 15. It will be observed that the belts 15 and 28 are arranged to gradually approach at the outer point of their travel, the rollers 16 and 29 acting to press surplus moisture from the pulp and to deliver the pulp in a formed sheet 30 upon a suitable carrier or platform 31, from or by which it is taken, dried and cut into suitable sheets or strips.

With this construction, it is obvious that the fibrous pulp is applied to the forming screen under considerable hydraulic pressure, which causes the fibres to felt together and to adhere to the screen in a gradually increasing layer as the screen rotates about the cylinder 6. When the screen 15 leaves the forming vat, there is adhering to it a thick mass of the pulp, from which the greater part of the liquid is withdrawn into the interior of the cylinder, and as this thick pulpy sheet is withdrawn between the screens 15 and 28, the moisture is further removed by squeezing rolls 16 and 29, and the pressure being removed from the upper screen 15, the pulped mass rests upon the lower screen 28 so that when the end of travel of the screen is reached, the sheet 30 is pressed tightly together and engages a platform or carrier 31 from which it may be taken, dried and cut.

In mounting the rollers 16 and 29, and one of the idle rollers 17, a plate 32 may be provided at each side of the screens 15 and 28 in which the rollers are mounted, to confine or to assist in confining the matted pulp between the screens. These rollers may also be provided with end flanges 33 for positioning the screens and also to partially confine the pulp therebetween.

Although this apparatus may be used for felting together fibrous materials of various kinds, it is particularly designed and adapted for use in making fibrous sheet materials from long and short fibres of a coarse or woody nature, such as shredded corn stalks and even including the pith, leaves, stalk, cobs and roots. By applying pressure to a pulped mass of coarse fibres, it is possible to collect a sufficient thickness of pulp on the forming screen in one rotation thereof to make a thick felt or board in a single layer. It is necessary to have a mass of pulp several times the thickness of the finished sheet required and by depositing the pulp on the forming screen in a single operation under pressure requires a forming vat of less size, thereby economizing in space and in the cost of the equipment.

While I have shown and described my invention in a preferred embodiment thereof, it is obvious that other changes may be made without departing from the spirit and scope of the invention.

I claim:

1. In an apparatus for forming fibre sheet material, the combination with a vat, of a per-

forated cylinder rotatable in the vat, a belt extending from the outside of the vat around the cylinder, means for feeding pulped fibrous material under pressure into the vat, and means forming a substantially fluid-tight connection between the vat and the belt where it enters the vat.

2. In an apparatus for forming fibrous sheet material, a vat, means for feeding pulp under pressure to the vat, a perforated forming cylinder mounted in the vat, means forming a closed discharge for liquid from the interior of the forming cylinder, a foraminous belt extending about the roller, and means forming a substantially fluid-tight connection between the belt and the vat at the point of entry of the belt into the vat.

3. In an apparatus for forming fibrous sheet material, a forming vat, a perforated cylinder rotatable therein, a screen belt extending from the outside of the vat partially around the cylinder, and means pressing the belt against the cylinder at the point where it enters the vat and forming a substantially fluid-tight connection therewith.

4. In an apparatus for forming fibrous sheet material, a forming vat, a cylinder rotatable therein having projecting spaced flanges, a belt extending from the outside of the vat partially around the cylinder between the flanges, and means comprising a roller having grooves for engaging the flanges and adapted to make a substantially fluid-tight connection between the vat and the belt.

5. In an apparatus for forming fibrous sheet material, a vat, a perforated cylinder rotatable therein, a foraminous belt extending from the outside of the vat, substantially around the cylinder, another belt extending below the other belt in contact with the vat for receiving fibrous sheet material collected by the said other belt in its passage around the cylinder, and means for supplying pulp under pressure to the belt in its passage about the cylinder so that it carries a thick sheet of fibrous material to the other belt.

6. In an apparatus for forming fibre sheet material, a forming vat, a forming cylinder rotatable therein, means for supplying pulped fibre under pressure to the forming vat, a foraminous belt extending from without the vat partially around the cylinder, means forming a substantially fluid-tight connection between the vat and the belt where it enters the vat, and a second belt extending below the first belt from the place where the first belt passes out of the vat for receiving the fibrous material which adheres to the first belt during its passage through the vat.

7. In an apparatus for forming fibrous sheet material, a substantially closed forming vat, a perforated cylinder rotatable therein, an endless screen belt extending from the outside of the vat and substantially around the cylinder, another belt extending below the

first named belt for receiving fibrous sheet material collected by the first named belt in its passage about the cylinder, means for supplying pulp under pressure to the first named belt in its passage about the cylinder so that it carries a thick sheet of fibrous material to the second belt, and means for removing surplus liquid from the interior of the cylinder causing the fibrous material of the pulp to adhere to the first named belt as it passes about the cylinder, and means for thereafter pressing and drying the removed material in a continuous sheet.

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