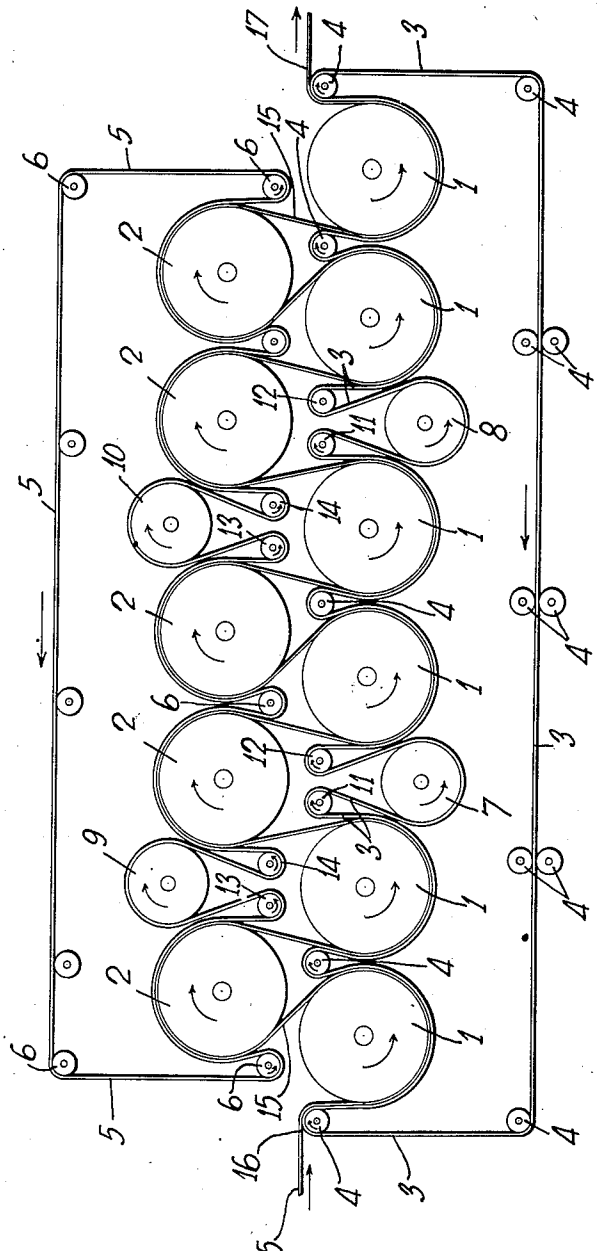
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FELT DRIER

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William P Feeney Inventor

By his Attorneys

Hoguet & Neary

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WILLIAM P. FEENEY, OF MANISTEE, MICHIGAN

FELT DRIER

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My invention relates to a paper making process and more particularly to a method and apparatus for keeping the carrying or drier felt on the "drying end" in the most desirable condition.

In paper manufacture the usual procedure after passing the paper forward off the "wet end" is to conduct it by means of endless bands of felt to a first pair of "press rolls". These "press rolls" remove a portion of the water from the loosely packed fibers. The paper may then be passed through other press rolls or similar devices until it no longer has free water. In this condition, however, although it may not have free water present it is still very moist and must be thoroughly dried. For this purpose it is passed into the "drying end" of the paper making machine.

This drying usually consists in passing the paper around steam heated cylinders. The paper is kept in contact with these cylinders by means of an endless felt band. The arrangement and apparatus is well known in the art and usually consists in two rows of heated paper drying cylinders one above the other. The paper is carried around the lower heated cylinder and kept in contact with it by means of an endless felt band which runs against and is directed up between each adjacent cylinder in the lower row by means of properly placed idler rolls. The paper then passes up over and around the first of the adjacent upper rows of cylinders and is again kept in contact with the hot upper cylinders by means of an endless felt band which is again directed by means of idler rolls so that it is kept in contact against a maximum portion of each of the heated cylindrical surfaces.

The cylinders are rotated at a uniform rate. The paper is not strong enough to bear its own weight except for a very short distance and is carried and held against the surface of the drying cylinders by means of the endless felt bands. The number of these drying cylinders depends, of course, on the weight of the paper and percentage of moisture present which must be removed. The papers pass from the drying end of the dry cylinders to calendars or other equipment depending upon the type of paper being run and/or desired.

These drier felts pick up, of course, considerable moisture from the wet paper and it has previously been the usual procedure to dry the felts, after they pass from the drying end of the group of paper drying cylinders, by passing them over felt drying cylinders. The dried felt is then returned to the wet end of the drying cylinders. However, such a method of drying the felt only after it has passed over the drying cylinders and after it has delivered the paper to the calendars has several outstanding disadvantages. One of these is that the felts, of course, pick up considerable water from the wet paper, this water being held in the felt by capillary attraction. As the paper and felt pass over the hot drying cylinders, steam is generated from the moisture in the paper. The felt having picked up considerable water, tends to form an impervious covering over the paper and makes it difficult for the steam to escape through the felt. The result is that uneven portions may be formed on the paper and the felt subjected to unnecessary strain.

Also the absorption of considerable moisture by the felts causes them, of course, to expand slightly and then when the moisture is removed the felt contracts. This expansion and contraction causes considerable wear on the fibers of the felt and furthermore is apt to cause thin spots in the felt which affect considerably the surface of the paper.

One of the primary objects of my invention is to eliminate the disadvantages outlined above.

Another object of my invention is to obtain an even and continuous drying of drier felts.

Other objects and advantages of my invention will appear in the following specification and drawing in which I have shown a diagrammatic representation of an apparatus suitable for carrying out my process.

Referring more particularly to the drawing in which like reference characters de-

note like parts I have shown a lower row of drying cylinders 1 and an upper row of drying cylinders 2 which make up the apparatus for drying the wet paper. Against the lower row of drying cylinders and following them at the same speed at which they are rotated there passes the endless band of drying felt 3. This drying felt is brought in contact with the cylinders and directed from the dry end back to the wet end by means of the guide or idling rollers 4. A similar endless band of drier felt 5 is carried by the rollers 6 against the upper row of drying cylinders. As is well known in the art, these endless bands of drier felt hold the paper against the surface of the drying cylinders and carry the paper to a great extent. Such a procedure is particularly necessary at the wet end of the drying cylinders where the paper has not as yet become strong enough to bear its own weight except over very short distances. The rows of cylinders 1 and 2 are heated, of course, in the usual manner by steam or otherwise.

Between the paper drying cylinders 1 of the lower row, I have placed at intervals auxiliary drying cylinders 7 and 8 and in a similar manner have placed the auxiliary drying cylinders 9 and 10 between the paper drying cylinders of the upper row. The paper is directed through the apparatus in a figure 8 fashion and I do not permit it to pass over the auxiliary cylinders. By means of properly arranged idler rolls, however, I cause the drier felt to pass around and against these auxiliary drying cylinders. The lower drying felt 3 is carried up around and between the cylinders by means of the idler rollers 4. At the paper drying cylinder, just before the auxiliary cylinder 7, the felt is kept against the paper drying cylinder by means of the roller 11. I then cause it to pass down around the auxiliary roller 7 and back around the roller 12 so that it bears against the next heated paper drying surface. The idler rolls 13 and 14 are arranged in a similar fashion to co-operate with the auxiliary felt drying cylinders 9 and 10 in the upper row. These felt drying cylinders may be placed between each drying cylinder if desired or arranged in any suitable way depending upon the percentage of moisture picked up in the band of drier felt over a given distance. I have shown only six drying cylinders in the lower row and five in the upper row, but it is, of course, understood any desired number may be used or several groups of drying cylinders with coacting drier felts may be utilized.

The wet paper 15 from the press rolls enters the "dry end" apparatus at 16 and the dried paper leaves at 17 after which it may be passed to smoothing rolls, calendar rolls, or other desired equipment. The wet paper passes on to the drier felt 3 and is carried down between the drier felt and the first drying cylinder 1. It passes then from this cylinder around the first drier cylinder 2 of the upper row and is kept firmly in contact with this cylinder by means of the upper drier felt 5. The drier felts on these first rolls pick up considerable water from the wet paper partly due to the absorption or blotting action or partly due to condensation in a relatively cool felt of a portion of the steam generated on the contact of the wet paper with the hot drying cylinders. The upper felt after passing against the first drying cylinder, passes over the felt drying cylinder 9, as shown in my diagrammatic representation, whereupon it absorbs heat. The moisture picked up on the first drying cylinder 2 is thus removed. The felt then passes to the second drying cylinder 2 in a relatively dry condition. It is seen, therefore, that any steam generated on this second drying cylinder will easily pass through the felt without any difficulty or disadvantageous results. This continual drying of the drier felt by means of the felt drier rolls keeps the drier felts in a dry state, that is, in a relatively uniform condition as to moisture content and temperature. Thus the drier felt may at all times operate at the best condition from the standpoint of paper produced and minimizing wear of the felts. The operation of the felt band, paper drying cylinders and the felt drying cylinders on the lower row is substantially similar to that described above.

It is seen, therefore, that I am able to utilize my drier felts at the best operative conditions which is of great commercial importance inasmuch as these drier felts are a considerable item in the expense of drying paper. Furthermore, I have found that by my process a greater amount of paper can be dried with a given amount of steam than could be dried by the methods previously known to the art. The drier felts last longer and are kept in better condition and the paper produced is more evenly dried and is of a better quality than was formerly possible to obtain.

It will be apparent to those skilled in the art that certain changes and modifications may be made without departing from the spirit of my invention and I, therefore, do not wish to be limited by the specification and drawing, but only by the appended claims.

What I claim is:

1. In a paper drying device, a plurality of upper and lower cylinders comprising a series of a plurality of heated paper cylinders, means for passing paper around said cylinders, said means including a pair of endless felt drier bands operating around

each upper and lower series of paper cylinders, a plurality of felt drier cylinders at intervals intermediate each series of said paper drier cylinders and adapted to be contacted solely by said felt bands, whereby the moisture is continuously and at progressively intermediate points in the series removed from a felt band of a series of paper cylinders, guides associated with said cylinders and said felt drier bands adapted to hold said bands in contact with said paper and to direct the bands of felt about said felt drier cylinders, said guides operating to direct the paper contacting surface of said felt bands against said felt drier cylinders.

2. In a paper drying device, a plurality of cylinders comprising a series of heated paper cylinders, means for passing wet paper around said cylinders, said means including an endless felt band operating around said series of paper cylinders, a plurality of felt drier cylinders placed at intervals intermediate a series of paper drier cylinders, and adapted to be contacted solely by said felt band whereby the moisture is continuously and at progressively intermediate points in the series removed from a felt band of a series of paper cylinders, guides associated with said cylinder and said band adapted to hold the band in close contact with said paper and subsequently to direct the paper contacting surface of said drier band next to and about said felt drier cylinders.

In testimony whereof, I have signed my name to this specification this 5 day of November 1930.

WILLIAM P. FEENEY.