May 9, 1933. E. W. CLEM 1,908,406

PAPER DRIER

Filed Jan. 10, 1931

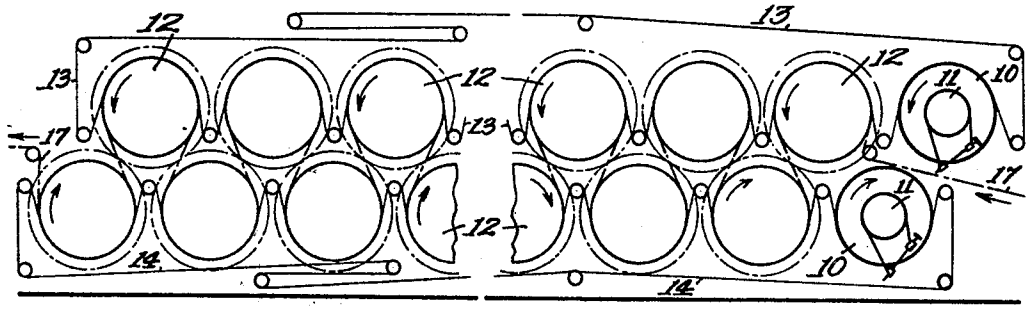

Fig. 1.

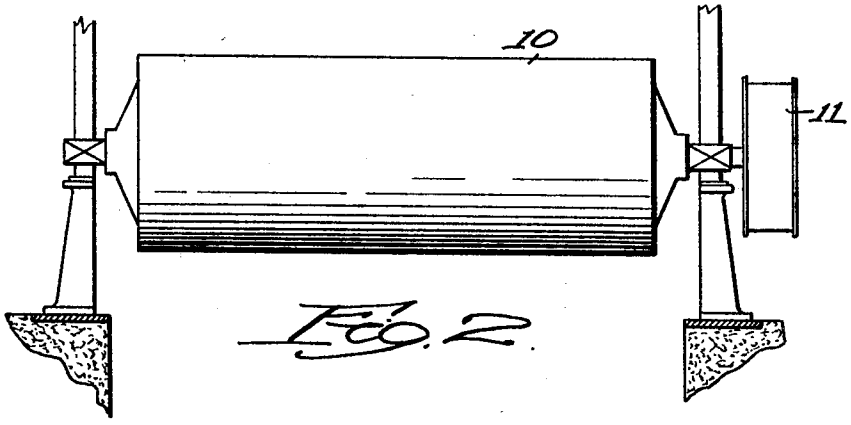

Fig. 2.

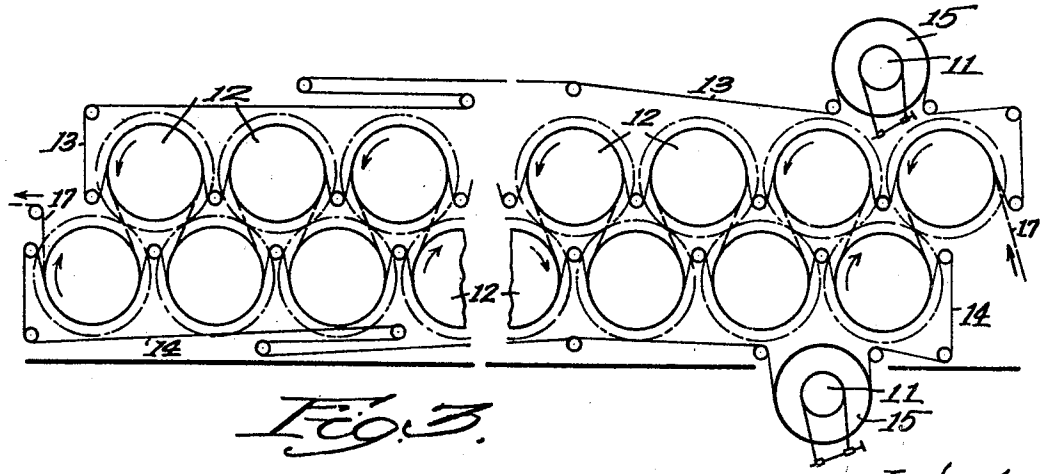

Fig. 3.

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UNITED STATES PATENT OFFICE

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PAPER DRIER

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This principal object of this invention is to provide for allowing paper in a paper drier used in connection with paper making machinery to shrink naturally, whereby the excessive reduction in width of the paper now usual is reduced to a natural shrinkage, and the corresponding reduction in the strength of the web will be avoided.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawing, in which

Fig. 1 is a side view of a paper drier partially diagrammatic, showing the application of this invention thereto;

Fig. 2 is an end view showing one of the driers with brake drums, and

Fig. 3 is a view like Fig. 1 of a modification.

The ordinary paper drier on the market consists of a series of drying drums arranged in an upper and lower tier and geared together. The web of paper passes around each drier and must necessarily move in accordance with the surface speed of the drier. Two felts are used, one to press the paper against one tier of driers, and the other against the other tier. These felts are driven at the surface speed of the driers by the driers and tend to force the paper still more accurately to move at the same speed as the surface speed of the driers. The purpose, of course, of the drier is to dry the paper and the effect is not only to dry but to shrink it. Inasmuch as these driers are constructed so that the paper cannot shrink lengthwise, the shrinkage occurs crosswise. The result is that when the paper is dried it has shrunk in width and this shrinkage is not uniform. Furthermore as the natural tendency of the paper is to shrink while on the surface of each of the drums and between the driers and that tendency is practically restrained lengthwise by the conditions above mentioned, the strength of the web is materially reduced and a sheet is produced not uniform in density.

To prevent this, one top and one bottom drier 10 are jacketed, and the driving gear of these two driers removed and a brake drum 11 added to the journal for regulating the speed of each jacketed drier. These driers 10 control the two felts 13 and 14 but are not connected with the driving mechanism. The remaining driers 12 on the machine are driven in the customary manner, all having the same surface speed. The regular driers 12, being driven, and the jacketed driers 10, being held back by the braking effect of the braking drum 11 mounted on the journal, cause the felt to travel at a slower speed than the driven driers. This in turn creates a slip between the drier and the felt. The braking action of the jacketed drier causes a difference in tension between each two adjacent driers, this tension varying from a minimum at the last drier to a maximum at the first drier preceding the jacketed drier.

The tendency of the paper 17 to shrink increases as it becomes drier. Therefore, as it approaches the dry end of the nest of driers, the tendency to shrink is at its maximum and the felt tension is at its minimum, allowing the driers to slip on the surface of the paper similar to an ironing effect, the felt controlling to a greater degree than the driers the shrinkage in the paper.

The location of the jacketed driers depends entirely upon the number of driers used, the kind of paper, and the type of felt, and therefore it is impossible to be specific in the location of these driers. In Fig. 1 the jacketed driers 10 are two of the ordinary series of driers. In Fig. 3 two additional drums 15 are used, but the effect is substantially the same.

The advantages of this are that due to less tension between the driers and the felt, the paper shrinks more naturally, greater width is obtained in the sheet as well as more uniform strength for the width of the sheet. More even density is obtained and other physical characteristics greatly improved. The driers can be divided up into sections each with its upper and lower felt, and the tension controlled as hereinbefore described or a different number of tiers can be used. The arrangement of drying drums can be modified.

Although I have illustrated and described only two forms of the invention I am aware of the fact that other modifications can be made in the art without departing from the scope of the invention as expressed in the claims. Therefore I do not wish to be limited in this respect but what I do claim is:—

1. In a drying machine for web material, the combination of a series of driers of the same diameter over which the web is led one after the other, means for driving them at uniform speed, a felt passing around with the web, and a brake drum over which the felt passes for preventing the web from traveling at the same speed as the driers.

2. In a machine for drying paper, the combination of a series of internally heated paper driers arranged in a plurality of tiers, and staggered, each drier being driven at uniform speed, felts passing around the driers in contact with the web, and brake drums around which the respective felts pass to hold the paper web against their respective driers, said felts being held back by the brake drums, whereby natural shrinkage of the web will take place.

3. In a machine for drying paper, the combination of a series of internally heated paper driers, felts passing around the driers in contact with the web, and brake drums around which the respective felts pass, said felts being held back by the brake drums, whereby natural shrinkage of the web will take place.

In testimony whereof I have hereunto affixed my signature.

EVERETT W. CLEM.