



## UNITED STATES PATENT OFFICE.

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## MACHINE FOR MAKING ELASTIC PAPER.

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This invention relates to transversely creping or crinkling a web of paper.

The object of the invention is to provide an improved machine which is very simple and inexpensive in construction and operation, which will produce transversely crinkled paper at a high rate of production, and which may be employed to transversely crinkle papers of various weights and strengths without tearing or otherwise injuring the same.

A further aim of the invention is to provide an improved arrangement for crinkling paper wherein a fixed doctor blade, heretofore employed to strip the paper from the crinkling cylinder and crinkle the paper, together with its attendant disadvantages, is eliminated.

In accordance with the present invention, there is provided a rotating doctor which is so associated with a crinkling cylinder that the cylinder carries the paper against the periphery of the doctor. Associated with the crinkling cylinder and the rotating doctor may be a suction box so disposed as to hold the paper on the crinkling cylinder as it is brought against the rotating doctor.

Other objects will be in part obvious and in part pointed out more in detail.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the appended claims.

In the accompanying drawings, wherein I have shown, for illustrative purposes, one embodiment which the present invention may take, this disclosure being more or less conventional or diagrammatic:

Figure 1 is a vertical sectional view through so much of the machine as is necessary to explain the invention; and

Fig. 2 is a top plan view of the machine.

Referring to the drawings in detail, A designates generally the crinkling cylinder or carrier, and B designates the rotating doctor. The cylinder A is provided with a plurality of spaced apart disks or flanges 10 between which are relatively deep annular grooves or channels 11. The doctor has

a plurality of flanges or disks 12 which alternate with the flanges 10 and extend into the grooves 11. The flanges or disks 10 of the cylinder extend into the grooves or channels 13 of the doctor. Thus, it will be seen that the peripheries of the disks or flanges of the doctor and cylinder intersect, so to speak, and, preferably, the angle 14 between the peripheries of the cylinder and the doctor is relatively large. The peripheries of the flanges 12 of the doctor are, by preference, roughened as by notching in order to aid in preventing the paper from slipping over these surfaces without being crinkled. The doctor is driven at a slower peripheral speed than that of the cylinder so that, as the cylinder carries the paper against the periphery of the doctor, the speed of the paper is retarded, resulting in crinkling of the paper.

In the present illustrative disclosure, the shaft 15 of the cylinder A is provided with a gear 16 which meshes with the intermediate gear 16<sup>a</sup> which, in turn, meshes with a larger gear 17 on the shaft 18 of the doctor. Obviously, the relative sizes of the doctor and cylinder and the gears 16 and 17 may be varied as desired, depending upon the degree of creping or crinkling to be produced. The web of paper, designated generally by the letter P, may be delivered to the crinkling cylinder through a pair of rolls 19 and associated with the cylinder may be a roll 20 between which and the cylinder the paper passes. The crinkled portion of the web is designated by the letter P'. After the paper is crinkled, it may be delivered to a suitable belt 21.

For the purpose of holding the paper on the periphery of the cylinder A, and to prevent premature stripping of the paper from this cylinder adjacent the rotating doctor, I provide a suction arrangement which is here shown more or less diagrammatically as comprising a suction box C. The suction box has an opening in its upper face in which the upper portions of the doctor and cylinder are located. To the rear of this opening, the suction box has a wall 25 which is substantially tangential to the periphery of the cylinder, and the edge of this wall is in close proximity to the cylinder. The

paper P, as it passes from the rolls 19 to the cylinder, slides over this wall and, in part, seals the crack between the edge of the wall and the cylinder. The forward end of the suction box has a wall 26 which is preferably tangential to the periphery of the doctor and extends into close proximity thereto. The crinkled paper slides over this wall and onto the belt 21, as shown most clearly in Fig. 1. It is noted that the suction set up in the suction box is effective in the channels or grooves 11 and 13 of the cylinder and doctor respectively, so that the paper is closely held against the peripheries of the disks of these members. Owing to the arrangement of the cylinder and to the effect of the suction, the paper, particularly if it is dampened, will be longitudinally corrugated so that the resultant paper is longitudinally corrugated and cross crinkled making it more or less elastic in all directions. The paper web may be crinkled in a dry state, or it may be dampened if desired.

I claim as my invention:

1. In a machine for crinkling paper webs, a cylinder, a rotating doctor intersecting the periphery of said cylinder, and means for driving the doctor in the same direction as but at a slower speed than said cylinder.
2. In a machine for crinkling paper webs, a cylinder provided with circumferential grooves, a doctor having circumferential flanges extending into said grooves, and means for rotating the doctor in the same direction as but at a slower speed than said cylinder.
3. In a machine for crinkling paper webs, a cylinder provided with circumferential flanges and grooves therebetween, a rotating cylindrical doctor having circumferential flanges extending into the grooves of said cylinder, and means for rotating said doctor

in the same direction as but at a slower speed than said cylinder.

4. In a machine for crinkling paper webs, a cylinder, a rotating doctor intersecting the periphery of said cylinder, means for driving the doctor in the same direction as but at a slower speed than said cylinder, and suction means for holding the paper on said cylinder.

5. In a machine for crinkling paper webs, a cylinder provided with circumferential grooves, a doctor having circumferential flanges extending into said grooves, means for rotating the doctor in the same direction as but at a slower speed than said cylinder, and means for creating a suction in the grooves of said cylinder beneath the paper thereon.

6. In a machine for crinkling paper webs, a cylinder provided with circumferential flanges and grooves therebetween, a rotating doctor having circumferential flanges and grooves therebetween, the flanges of said cylinder overlapping those of said doctor, means for rotating said doctor in the same direction as but at a slower speed than said cylinder, and means for creating a suction in the grooves of said cylinder and doctor and beneath the paper thereon.

7. In a machine for crinkling paper webs, a rotating cylinder provided with circumferential flanges and grooves therebetween, a rotating doctor having circumferential flanges extending into the grooves of said cylinder, means for rotating said doctor in the same direction as but at a slower speed than said cylinder, and a suction box in which said cylinder and doctor are positioned, said suction box having an opening into which said cylinder and doctor extend.

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