June 15, 1926. 1,588,732

F. H. HOBERG

DOCTOR PLATE

Filed May 23, 1923

Fig. 1.

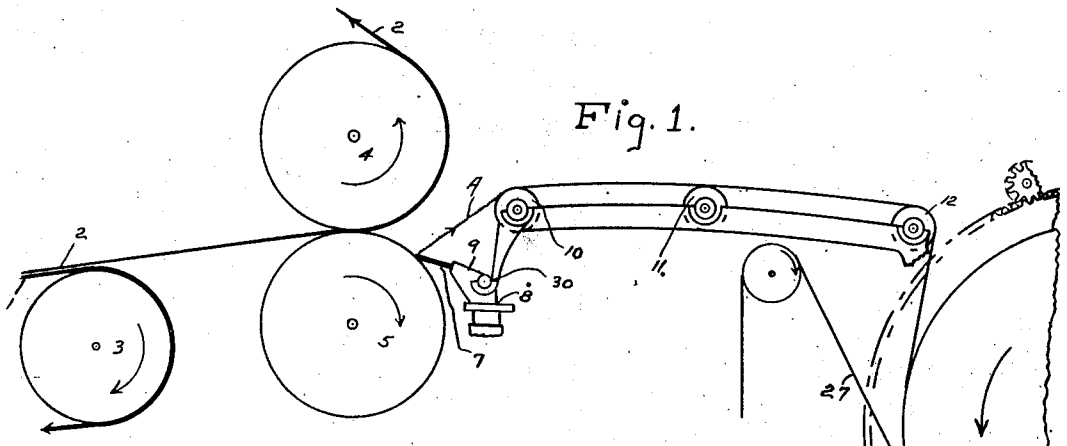


Fig. 2.

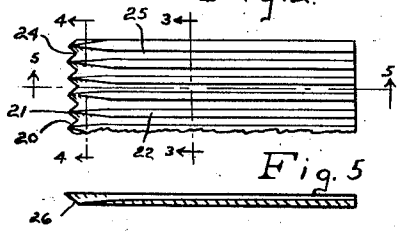


Fig. 3.

Fig. 4.

Fig. 5

Fig. 6.

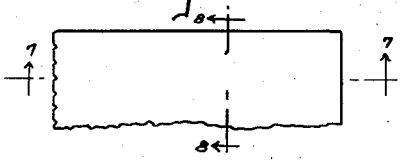


Fig. 9



Fig. 7.

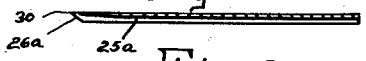


Fig. 8.

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DOCTOR PLATE.

Application filed May 23, 1923. Serial No. 640,811.

This invention relates to improvements in doctor plates, i. e., in plates employed as take-off plates to remove moist paper from a compression roll to which it tends to adhere.

The objects of this invention are to provide means whereby the paper may be longitudinally crêped to form stripes extending continuously from one end of the strip of paper to the other and each stripe having upset or displaced fibers characteristic of what is generally known as crêpe paper, whereas the paper in the spaces between the stripes or crêped zones may be of any ordinary type, either plain or transversely crêped.

In the drawings:—

Figure 1 is a conventional side view of a portion of a paper making machine showing the compression rolls, a portion of the initial drying roll and associated parts.

Figure 2 is a plan view of a doctor plate embodying my invention.

Figures 3 and 4 are sectional views drawn, respectively, to lines 3—3 and 4—4 of Figure 2.

Figure 5 is a longitudinal section drawn to line 5—5 of Figure 2.

Figure 6 is a plan view showing a modified form of doctor plate.

Figures 7 and 8 are sectional views drawn, respectively, to lines 7—7 and 8—8 of Figure 6.

Figure 9 is a fragmentary view on an enlarged scale showing the longitudinal crêping or striping effect produced by my improved doctor plate.

Like parts are identified by the same reference characters throughout the several views.

The paper pulp is fed upon an apron 1 and carried between it and a superposed apron 2 traveling at the same speed. After the water has been drawn out of the pulp and the pulp compacted sufficiently to form a continuous sheet of paper, the lower apron is run off around a roller 3 in such a manner as to leave the paper adhering to the upper apron, which is ordinarily composed of felt and which carries it between compression rollers 4 and 5. The paper tends to adhere to the roller 5, the felt apron passing upwardly around the roller 4 as indicated in Fig. 1. After the paper has thus been separated from the felt apron it is disengaged from the compression roller 5 by a doctor plate 7, the latter being pivotally supported from the frame 8 by a bracket 9. When separated from the compression roller 5 by the doctor plate the paper passes over a series of idler rollers 10, 11, and 12 to the initial drying roller 13.

The parts above described may be of any ordinary construction, except as to the form of the doctor plate, which is provided with a serrated edge margin 20 for contact with the compression roller 5. The apices 21 of the serrated margin are relatively high, being the terminals of longitudinally extending ribs 22. The reentrant angles 24 are at the bases of longitudinally extending grooves 25 formed in the surface of the doctor plate between the ribs 22. The ribs and grooves may be formed by cutting parallel V-shaped grooves in the surface of the doctor plate and the serrated margin may be formed by beveling the working edge of the doctor plate from the opposite surface toward the grooved surface as best shown at 26 in Fig. 5.

The beveled surface 26 bears upon the surface of the roller 5 and is either slightly concave in conformity with the surface of the roller when first applied thereto or, if desired, it may be applied with the points 21 in contact with the roller and allowed to wear until the entire beveled surface assumes a curvature corresponding with that of the roller. The points 21 pass underneath the paper and lift it from the roller 5. These points engage the fibers of the paper with just sufficient force to displace them slightly and also upset them with a tendency to form a rib in the paper. The portions of the paper between the points 21 of the doctor plate are lifted by the ribs 25 and kept out of contact with the doctor plate, whereby these portions of the paper retain the appearance and texture imparted to them by the compression rolls. The paper is drawn over the idle rollers 10, 11 and 12 by the drying roll 13 and the co-operating apron 27 and it will be observed in Fig. 1 that the idle roller 10 is located at a higher level than the doctor plate, whereby the strip of paper A is immediately lifted from the working edge of the doctor plate and passes divergently therefrom to the upper surface of said roller 10.

The bracket 9 is pivotally supported from the frame at 30 and allows the doctor plate to swing by gravity into contact with the compression roller 5 and to continuously

take up wear by continuing to swing downwardly in proportion to the lessening dimensions of the plate.

While I have referred to the working edge of the doctor plate as having a serrated margin it will be understood from the above description of the preferred form of my invention that the serrations differ from ordinary serrations in that the sides of the notches extend obliquely downwardly and rearwardly from the points 21 to the bases of the grooves. The paper will be transversely crêped or ribbed between the stripes only to the extent to which it is brought in contact with the converging end margins of these notches. Those portions of the paper which are lifted by the ribs out of contact with the roller 5 before touching the doctor plate will not be crêped but will retain the plain surface imparted to it by the compression rolls 4 and 5. The paper will, therefore, have longitudinally extending stripes *a'* which will not be crêped and the relative width of these stripes will be determined by the pitch of the sides of the grooves 25 which, in turn, determine the area of the paper which will contact with and be affected by the action of the doctor plate. The form of the grooves in cross section will, of course, have some effect in determining the width of the stripe and the character of the crêping action. But ordinary grooves V-shaped in cross-section will be found to give very satisfactory results, substantially as illustrated in Fig. 9.

In Figures 6, 7 and 8 I have illustrated a modified form of doctor plate in which the grooves 25^a are formed on the under surface of the doctor plate, the upper surface being flat. The grooves have the form of an inverted V in cross-section and by beveling the working margin downwardly and outwardly from the edge 30, as indicated at 26^a, it is obvious that the ribs will have chisel-shaped working ends, their edges 30 being chisel-shaped edges instead of pointed fingers as disclosed in Figures 2 to 6, inclusive. These chisel-shaped edges 30 are adapted to crêpe the paper transversely of each stripe, the striped effect being obtained by having plain bands or stripes of less width than the plain bands or stripes *a'* shown in Fig. 9. The notches or serrations in the working edge of this doctor plate will, of course, be much smaller than those of the plate shown in Figures 2 to 5, inclusive.

The grooves 25 or 25^a extend through the working edge of the doctor plate to a sufficient extent to maintain the notched or serrated form of the margin at least in the beveled surface, notwithstanding wear within practical limits. The wearing away of the doctor plate under its frictional contact with the roller will maintain a beveled surface at the working margin substantially as disclosed in the drawings and if the grooves extend far enough toward the pivotal axis so that the wearing away of the plate will continuously expose the grooved portion of the plate at the working edge for action upon the paper, the efficiency of the plate will remain substantially unimpaired for a considerable period of time.

In referring to the apices 21 of the doctor plate shown in Figures 2, 3 and 4 as points, it is not intended to imply that these are not chisel shaped. It is not essential that they should be either pointed like a needle or edged like a chisel. The transverse dimension determines to a considerable extent the width of the crêped stripe and the bluntness in the vertical dimension largely determines the degree of upset or displacement of the fibers.

I claim:—

1. A doctor plate for crêping paper and provided on one face with alternating ribs and grooves extending longitudinally across the plate, the working margin of said plate being beveled transversely across said ribs and grooves and the ribs being tapered towards said working margin to form a saw-toothed serrated edge transversely of said plate.

2. A doctor plate for crêping paper, provided on one face with alternating ribs and grooves and extending longitudinally across said plate, said plate having a beveled working margin crossing the ribs and grooves and providing V-shaped recesses between the ribs and along the working margin.

FRANK H. HOBERG.