Dec. 15, 1942. G. E. GIBBS 2,305,470

CREPING TREATMENT

Filed Aug. 1, 1940

Fig. 1.

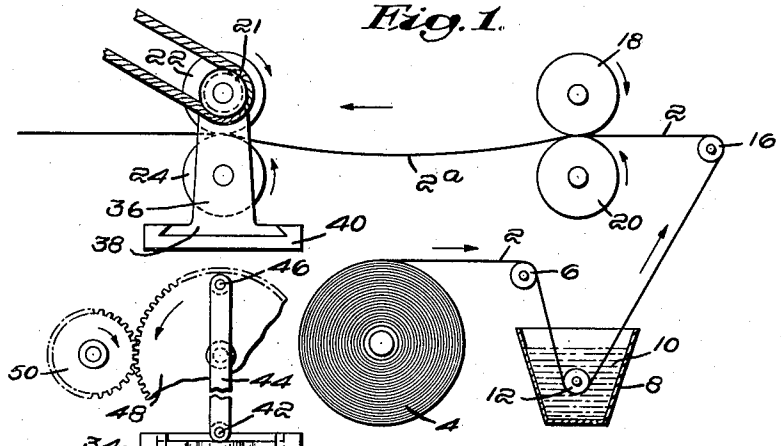

Fig. 2.

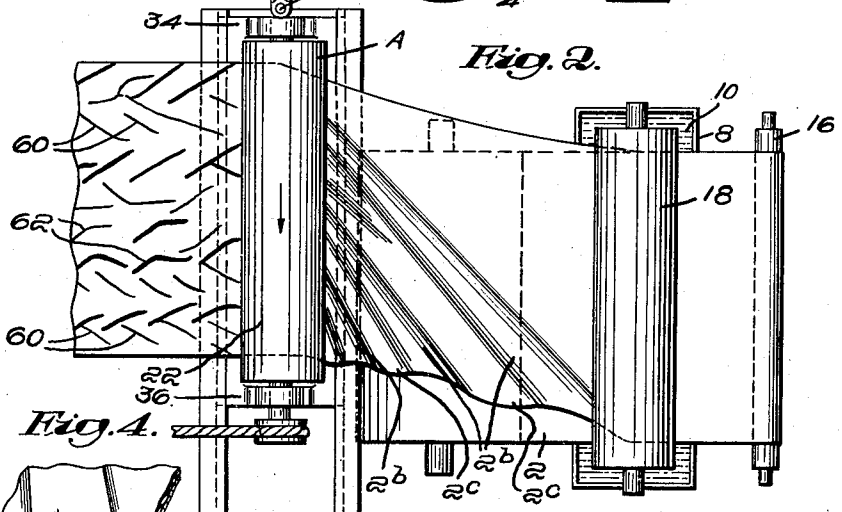

Fig. 4.

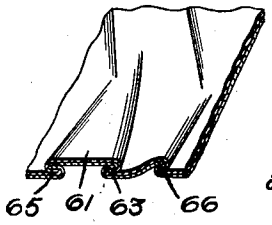

Fig. 3.

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CREPING TREATMENT

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Application August 1, 1940, Serial No. 349,369

4 Claims. (Cl. 154—30)

This invention relates to machines and methods for imparting stretchability to paper, or the like, and to the product produced thereby. Its object is to provide an inexpensive and greatly simplified treatment, as compared with those proposed heretofore, which imparts the desired amount and direction of stretchability to webs even of such bulky materials as reenforced wrapping paper made of adhered sheets of kraft reenforced with fibrous strands.

I have achieved this result by a novel treatment whereby, preferably, the web, after being moistened, is tensioned first in one direction and then in another at inclinations to its median line to distort it into waves which are subsequently pressed to form pleats extending in crossing directions that yield when the web is tensioned. Stretchability is thereby obtained in various directions from a single pleating operation with a large amount of stretchability directly transverse of the web.

In the drawing:

Fig. 1 is a side elevation view of a preferred form of my apparatus with the spaced pairs of rolls in aligned position;

Figs. 2 and 3 are plan views of my apparatus showing the opposite limits of a certain traverse motion to be described, and

Fig. 4 is a perspective view of a portion of finished material.

As shown in the drawing, Fig. 1, the web 2, of paper or the like, delivered from a suitable supply, such as the roll 4, is guided over idler roll 6 to a tank 8 containing water or other liquid 10, suitable for moistening the web, in which the web 2 is immersed by being drawn around roll 12 submerged in the liquid. From the bath the web passes around roll 16 and thence through two spaced pairs of rolls 18, 20 and 22, 24. I have shown the pair 22, 24 driven from a suitable power source 21. The rolls 18 and 20 may also be driven, but are preferably idlers. The upper roll of both pairs is suitably weighted or mounted in spring pressed bearings to nip the web 2 supported on the lower roll against slippage axially of the rolls.

One pair of rolls, in this instance the pair 22, 24, is connected with apparatus for imparting to it a traverse motion by which the web is oscillated back and forth in a direction substantially normal to its median line. For that purpose the rolls 22 and 24 are mounted on opposite frame members 34 and 36 connected by a base plate 38 which is tongued at its margins for reception in the grooved slideway 40. Pivoted to the frame member 34 at 42 is a connecting rod 44 pivoted at 46 to a gear wheel or the like 48 rotated by a source of power 50.

By this means, as the wheel 48 is driven, the rolls 22, 24 reciprocate axially from the extreme position shown at A in Fig. 2 to the opposite extreme position indicated at B in Fig. 3.

The portion 2*a* of the web between the rolls 18, 20 and 22, 24 is slightly slack, as indicated, when the rolls 22, 24 are midway of their extreme positions shown at A and B and in alignment with the rolls 18, 20. As the rolls 22, 24 move to their A position, they draw the web in a transverse direction while that part of the web nipped by rolls 18, 20 is held against transverse movement. Thereby the slack 2*a* is removed from the web and the web is tensioned along lines inclined to its median axis to distort the web into waves having crests 2*b* as viewed from about and valleys 2*c* extending to the bite of rolls 22, 24.

As the rolls 22, 24 move from their A position toward their B position, the web again becomes slack as indicated at 2*a* when rolls 22, 24 reach their mid position, after which the web is tensioned in the opposite direction relative to its medan line to form a series of waves having crests 2*d* and valleys 2*e* as viewed from above, also extending to the bite of rolls 22, 24.

The waves thus formed will usually not be uniform in size or shape, but are smaller toward the margins of the sheet and taper slightly toward the bite of rolls 22, 24.

The rolls 22, 24, as well as the rolls 18, 20, rotate constantly in the directions indicated by arrows to advance the web during this traverse motion and the waves formed as above described are crushed or pressed by the rolls 22, 24 to form pleats extending in crossing directions. At 60 I have designated pleats that are formed while the rolls 22, 24 are in their A position and at 62 I have designated pleats formed when the rolls 22, 24 are in their B position. Pleats extending in one direction or another will be formed at all times except when the web is in lengthwise alignment or approximately so. The majority of the pleats thus formed will constitute box pleats as shown at 61 in Fig. 4, bounded on one side by a fold 63 in one direction and on the other side by a fold 65 in the opposite direction, but there will be occasional single pleats as shown at 66. The pleats will not be uniform in length or in direction, but are more or less randomly disposed in crossing directions so that the sheet has an inherent stretchability in most, if not all

directions, with maximum stretchability usually in a transverse direction.

After the web emerges from rolls 22, 24 it is preferably dried to set the pleats.

The embodiment of my invention herein disclosed is preferred because of its simplicity and effectiveness even on such thick bulky webs as two plies of kraft paper 70, 72 united by asphalt 74 and reenforced with fibrous strands 76 between the plies. It can, of course, also be used on thin webs if desired.

The preferred embodiment of my invention above described can be variously modified, as will be apparent once the principle of my invention is understood. Thus the traverse motion can be effected in many different ways, such as by the use of cams, eccentrics, etc., and either or both pairs of rolls may receive such a traverse motion provided the web is tensioned and distorted in the manner indicated. The amplitude and speed of the traverse movements, the speed of advance of the web and the distance between the spaced pairs of nip rolls can be varied individually or collectively to alter the length and direction of the pleats and the amount of folding of the web at the pleats as desired, and for some purposes it may be preferable to employ an arcuate, rather than a rectilinear traverse motion.

There should be little or no slip of the paper axially of the rolls so that their traverse movement is effective to distort the web, for which purpose flanged rollers or the like may be employed if necessary, but in some instances it may be desirable to permit a slight slippage lengthwise of the web if required to insure the slack at 2a. If both pairs of rolls 18, 20 and 22, 24 are power driven and positively nip the web against any slippage, rolls 18, 20 should rotate sufficiently faster than rolls 22, 24 to provide for the lengthwise takeup of the web due to the pleating.

My invention is not to be limited to such details, except as the appended claims require.

I claim:

1. The method of imparting stretchability to a web of paper or the like which includes the steps of wetting the web, advancing the web between spaced pairs of rolls, both of which grasp the web against substantial slippage axially of the rolls, simultaneously oscillating one pair of rolls relative to the other pair in a generally axial direction to distort the web into waves of varying directions relative to the median line of the web, and pressing the waves to form pleats extending in crossing directions.

2. Apparatus for imparting stretchability to a web of paper or the like, comprising a pair of rolls adapted to nip the web and hold it against substantial movement axially of the rolls, means for rotating the rolls to advance the web, means engaging the web remotely from said rolls and holding it against substantial slippage transversely of the web, and means relatively moving said engaging means and said rolls in a direction transversely of the web to distort the web into waves extending to the nip of said rolls and varying in their directions longitudinally of the web, so that the rolls crush said waves to form pleats extending in crossing directions.

3. Apparatus for imparting stretchability to a web of paper or the like which includes means for wetting the web, spaced pairs of rolls for advancing the web, both of which grasp the web against substantial slippage axially of the rolls, means for oscillating one pair of rolls in a generally axial direction to distort the web into waves of varying directions relative to the median line of the web, and means for pressing the waves to form pleats extending in crossing directions.

4. Apparatus for imparting stretchability to a web of paper or the like comprising means for wetting the web, a pair of rolls adapted to nip the wetted web and hold it against substantial movement axially of the rolls, means for rotating the rolls to advance the web, means engaging the web remotely from said rolls and holding it against substantial slippage transversely of the web, and means relatively moving said engaging means and said rolls in a direction transversely of the web to distort the web into waves extending to the nip of said rolls and varying in their directions relative to the median line of the web, so that the rolls crush said waves to form pleats extending in crossing directions.

GEORGE E. GIBBS.