Aug. 17, 1926. 1,595,991

W. H. CANNARD

CREPE PAPER OR THE LIKE MATERIAL AND METHOD OF AND APPARATUS FOR PRODUCING SAME

Filed April 7, 1924 3 Sheets-Sheet 1

FIG. 1.

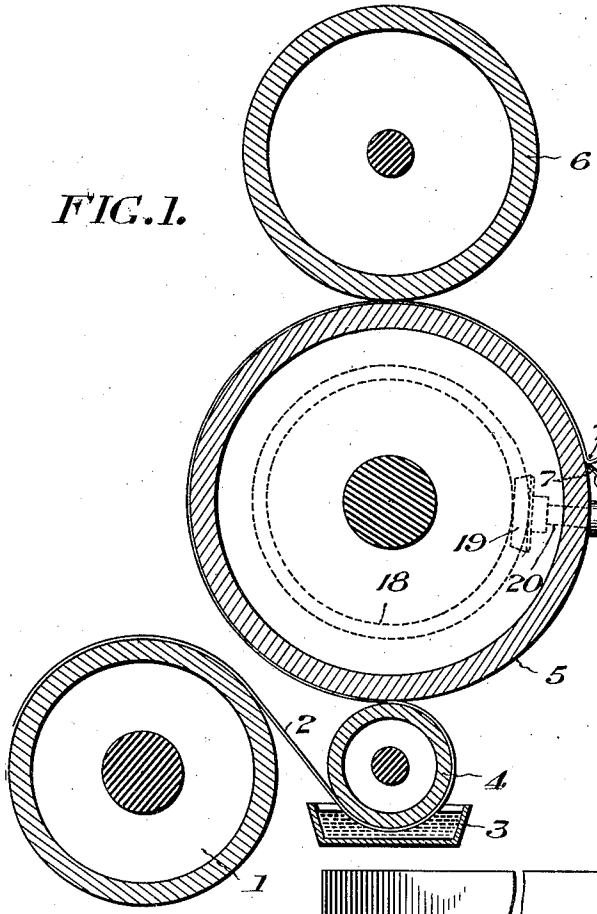


FIG. 3.

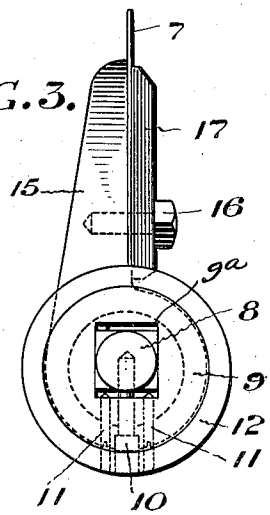
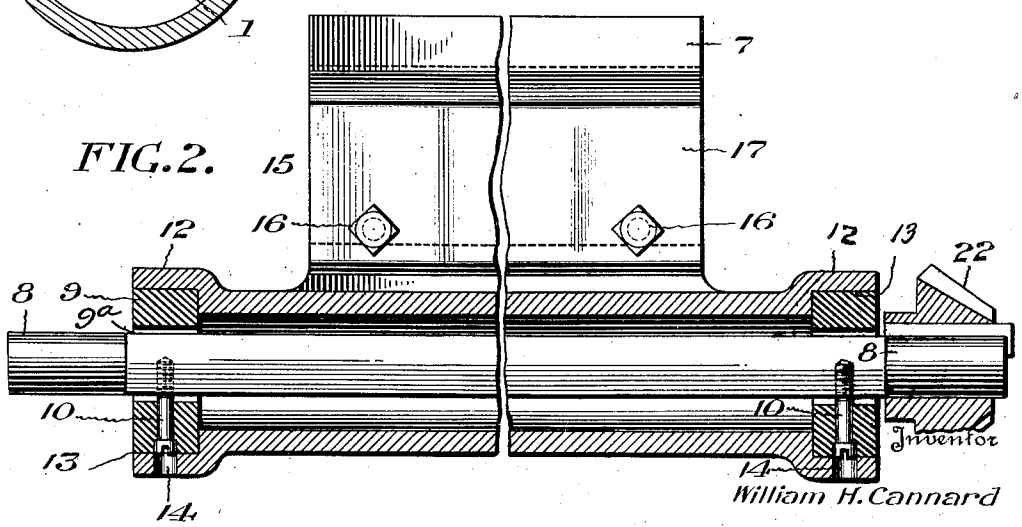


FIG. 2.



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FIG. 4.

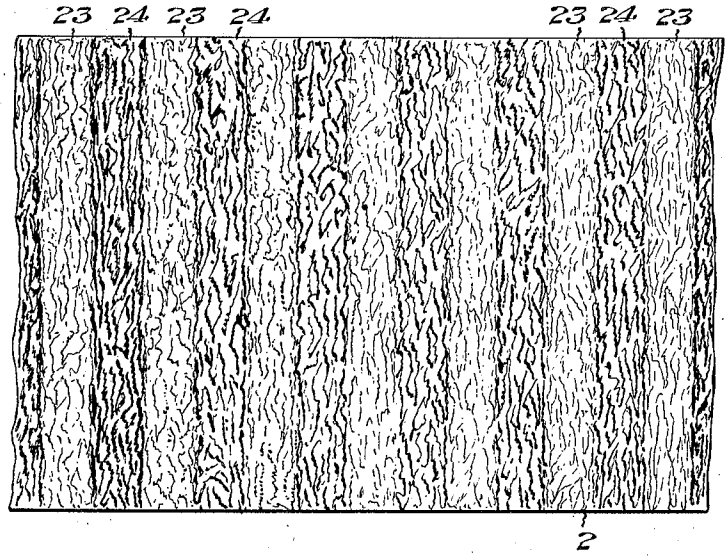


FIG. 5.

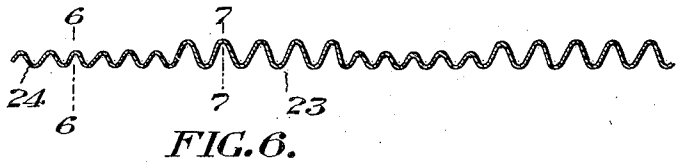


FIG. 6.



FIG. 7.

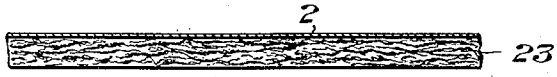
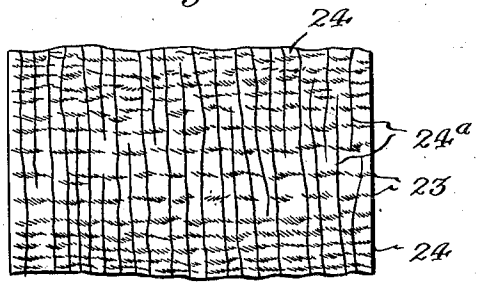


Fig. 11.



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Fig. 9.

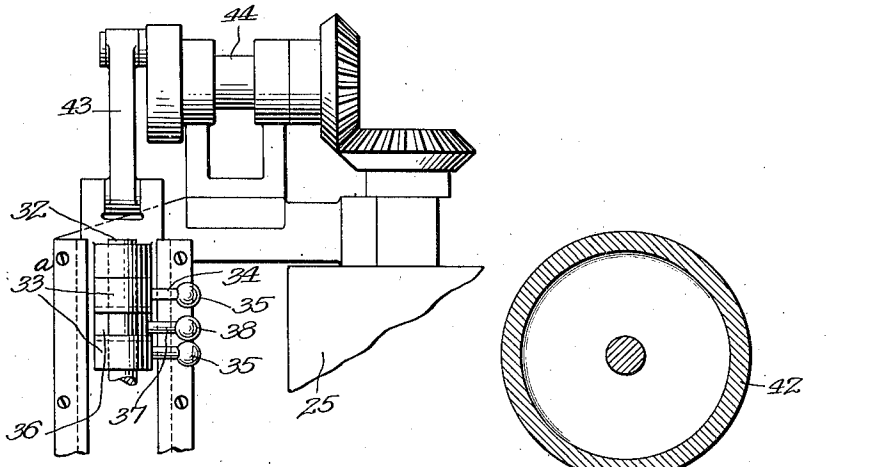


Fig. 8.

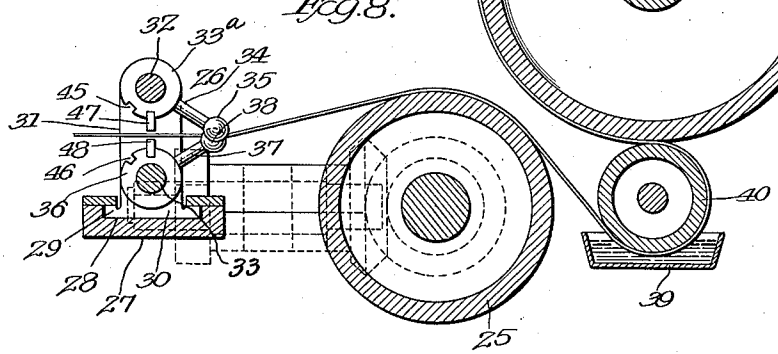
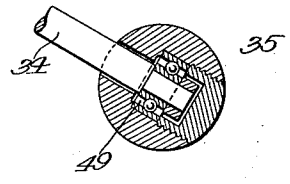


Fig. 10.



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UNITED STATES PATENT OFFICE.

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CREPE PAPER OR THE LIKE MATERIAL AND METHOD OF AND APPARATUS FOR PRODUCING SAME.

Application filed April 7, 1924. Serial No. 704,868.

This invention involves a new and improved crepe and method of and apparatus for producing same.

It is contemplated among the objects of the invention to produce a crepe wherein a web is crinkled or creped, a portion thereof having fine crepes or crinkles and a portion having coarser crinkles, these being in alternate or predetermined arrangement.

It has heretofore been rather general practice to produce crepe with crinkles of approximately uniform density; but, for certain uses, it is a decided advantage to have more elasticity therein and, thus, reduce liability of the crinkled portions of the paper to tear or break when subjected to stretching: One particular use for such paper is in the manufacture of bags and other containers, and liners therefor, and the use of a web embodying crinkles of predetermined degrees of coarseness and fineness has been found very effective in that connection.

Another object within the contemplation of the invention is the production of a crepe of this type by a new method of manufacture: Heretofore, in the production of crepe by the so-called "wet-method", it has been the practice generally, to press the moistened web upon the surface of a rotating roll and then scrape the web from the roll by the use of a so-called "doctor-blade". While provision may have been made therein for changing or varying the angle which the doctor-blade presented to the surface of the roll—in other words, a fixed setting of the doctor-blade—I am not aware of any attempt ever having been made to move, rotate, reciprocate, or otherwise vary the angle of the doctor-blade in relation to the moving web-carrying surface during the actual scraping operation or while the creping is being effected; and it is to be understood that this is one of the primary features which characterize the present invention. Thus, it will be understood that my inventive-concept involves a unique method of treating a web of material by producing a duplex crinkling action thereon whereby portions of the web will be characterized by relatively coarse and fine crinkles.

Still another object of the invention is to provide for an adjustment of the degree of angularity which the blade is to have, and to provide means for continuously and automatically changing the angle of the blade with respect to the roll-surface (within the limits of this adjustment) during the operation of these elements. Provision is also made for varying the speed with which the angle of the blade is changed in relation to the surface of the roll carrying the web, and for reciprocating the doctor-blade with relation to a portion of the web.

More specifically stated, instead of mounting the doctor-blade upon fixed supports as usual, it is mounted upon an eccentric, the sweep of which is adjustable. Provision is made for changing the speed with which the eccentric is driven and, in addition, for changing the angle at which the blade engages the roll-surface. A change is also effected in the speed with which the web is removed from the roll, in that, when the blade is advancing and the roll is rotating at a given speed against the advancing blade-edge, the web is removed at a greater speed than when the blade is receding. This change of angle and change of speed of removal of the web result in the production of a crepe wherein there is a change in the structure and arrangement of the crinkles, and this change may be varied almost infinitely by the adjustments provided. In the resultant product, this action effects varying degrees of crinkle along the web, and this I regard as a distinct improvement over the old product as well as the method of producing the same, while simplicity of mechanism is retained.

My improved method further involves the manufacture of crepe whereby a change of speed of removal of a web from a surface and a change of angle of a scraper with relation to the web-carrying surface are untilized to produce a web having changed form of crinkles or crepes, and wherein these are further varied by changing the speed with which the angle is varied and the speed with which the web is removed or scraped from the carrying surface.

It is to be understood that the objects and advantages contemplated are herein only touched upon in their broader sense, and that other objects and advantages will in part be apparent and in part be brought out more fully in the description which follows.

One embodiment of the invention showing one form of my improved product, illus-

trating the method, and a preferred type—as well as a modified type—of apparatus for producing it, and in connection with which my improved method is practiced, are exemplified in the accompanying drawings, wherein:

Figure 1 is a diagrammatic view, in vertical section, of a machine for producing crepe and embodying my invention;

Fig. 2 is a fragmentary view, partly in section and partly in elevation, illustrating a means for mounting a doctor-blade and for effecting an adjustment of certain portions thereof;

Fig. 3 is a view, in end elevation, of the blade and mounting shown in Fig. 2;

Fig. 4 is a view in plan partially illustrating (more or less diagrammatically) a form of crepe embodying my invention;

Fig. 5 is a view in longitudinal section through a web, looking at the edge thereof, and illustrating (more or less diagrammatically) the structural arrangement of crinkles or crepes in one product embodying the invention;

Fig. 6 is a similar view, but in transverse section, across the web and through the finer crinkles;

Fig. 7 is a similar view to Fig. 6 but taken through the coarser crinkles and illustrating the structural arrangement of the web;

Figs. 8, 9 and 10 are fragmentary views, in vertical transverse section, in plan, and in detail, respectively, of a modified form of machine and wherein longitudinal corrugations or crinkles are formed in the web as a preliminary step to the production therein of crinkles by the action of the doctor-blade; and

Fig. 11 is a view in plan illustrating (more or less diagrammatically) a form of crepe embodying my invention, wherein the web is longitudinally pleated or crinkled and then variably cross-crinkled.

The method involved comprises the production of crinkles of varying density in a web, and effecting this in apparatus by changing the angle of a scraper therein to a surface upon which the web has been pressed, and from which it is scraped, this change being effected during the actual scraping-operation. My inventive-concept also contemplates varying the speed with which the edge of the blade meets the oncoming web, thus producing in the web crinkles of varying density; and, furthermore, providing means for adjusting angular-change and speed-change, whereby the variety in the crinkles may be diversified within practically unlimited bounds.

One type of apparatus for practicing this method is shown in the drawings, and therein the reference-character 1 designates a stock or guide roll at which a web 2 enters the apparatus. Provision is preferably made for moistening the web and, to that end, a liquid-containing pan 3 is shown. The web 2 is led into the pan by passing around a roll 4, which presses the moistened web against the surface of a receiving-roll 5. A squeeze-roll 6 removes excess moisture from the web and further presses the web into intimate contact with the surface of the receiving-roll. These rolls may be driven in the usual manner and by any suitable means.

In conjunction with the receiving-roll, means are preferably provided for removing the web from the surface of the roll and, as here shown, a doctor-blade 7 is provided, a blunt edge 7^a of the blade bearing against the surface of the roll underneath the advancing web and functioning to scrape the web from said surface. The resultant crowding of the web in this operation effects a crinkling or creping of the web and as is well known practice.

Means are also provided, in the present instance, for varying the angle at which the blade is presented to the moving, web-carrying surface and, at the same time, varying the speed with which the web is removed from the roll, these changes being effected during the actual scraping operation as distinguished from fixedly setting the doctor-blade or adjusting and maintaining it in fixed or adjusted relation to the roll during the actual removal of the web. Such means, in this instance, comprises a shaft 8, suitably journaled in proximity to the receiving-roll and having disposed thereon a plurality of eccentrics 9. These eccentrics are adjustable with relation to the shaft; the means for effecting their adjustment comprising a slot 9^a in each eccentric through which the shaft 8 is passed and within which slot relative movement between the shaft and eccentric may be effected. Each eccentric is driven from the shaft, a squared portion of the shaft being passed through slots in the eccentrics, the side walls of the slot embracing opposite portions of the shaft. A screw 10 in each eccentric and having a portion threaded into the shaft is utilized to vary the position of the shaft in the eccentric-slot and, thus, to adjust the relation of the eccentric to the shaft, and a set-screw 11, threaded into each eccentric, bears at its inner end against the shaft and locks that eccentric in any adjusted position on the shaft.

Mounted upon these eccentrics is a sleeve 12, or the like, having bearing-portions 13 at either end and arranged for anti-friction bearing upon the eccentrics. Openings 14 are provided in these bearings to permit access to the adjusting-screws 10 and set-screws 11. Disposed on the sleeve is a carrier 15, on which the doctor-blade is mounted; bolts 16 and clamping-members 17 being the means here shown for this purpose.

Means are also provided for rotating the

shaft 8 and for varying the speed of rotation thereof; and, as here shown, such means include a gear 18, associated with one of the rolls, such as the receiving-roll 5, and shown in dotted lines in Fig. 1. In mesh with this is a pinion 19 mounted on a shaft 20 which carries, at its other end, another pinion 21 in mesh with a gear 22 adapted to be mounted on the drive-shaft; the pinions or gears being removable so that, by varying the ratio of these, one to the other, a change in the speed of the shaft may be effected.

The mechanism just described effects a change in the angle of the doctor-blade with relation to the surface of the receiving-roll from which the web is being scraped, and a change in degree of angularity between the blunt edge of the doctor-blade and the surface of the receiving-roll from which the web is being scraped, and causes the edge of the blade to reciprocate back and forth with relation to the oncoming web. The blunt edge of the blade bears against the surface of the roll under the web and, as the eccentrics are rotated on the shaft 8, the fulcrum or bearing-point carrying the outer end of the blade is changed or rotated within a range corresponding to the degree of eccentricity effected between shaft 8 and the bearing-surfaces of the eccentrics. In other words, the degree which the shaft is off-center with relation to the oppositely-disposed bearing-surfaces of the eccentrics will be the degree with which the angle of the doctor-blade will be changed with relation to the surface of the roll, and this will be continuously and automatically effected at predetermined periods and in predetermined degree during the removal of the web. The provision of the means for effecting adjustment of the eccentrics with relation to the shaft also permits adjustment of this angularity.

By mounting the blade eccentrically upon the shaft and moving it with relation to the surface of the receiving-roll, another unique result is effected, and this is the varying of the speed with which the web is removed from the roll: When the shaft 8 is rotated, the edge of the doctor-blade which bears upon the surface of the receiving-roll will be reciprocated back and forth against the surface of the roll and, when going forward against the web, the speed with which the web is removed will be greater than when the blade is being retracted and, on the forward movement of the blade, the fibers of the web will be more crowded together than when the blade is moving in the same direction as the web-carrying surface, or on the return stroke. This movement effects a variety or change in the structure of the crinkles which, due to the continuous rotation of the receiving-roll and movement of the web, causes intermittent crowding of the fibers of the web, and produces portions having finer crinkles disposed intermittently along the web. By varying the degree of angularity and the speed at which the eccentrics are driven, this variety may be produced within almost unlimited bounds.

The product or article of manufacture produced by the herein-described method is shown in Figs. 4 to 7. Therein I have illustrated, more or less diagrammatically, the character of the changes effected in, and the resultant structure of, the completed web. Ordinary crinkles of the usual density are indicated by the reference-character 23. In alternate arrangement with these along the web are portions 24 wherein the fibers of the web are more crowded and compact and the crinkles or crepes are of relatively greater density than in the other portions of the web. This effect is illustrated in Fig. 5, the finer portions 24 being shown as of less height in cross-section than the coarser and more usual portions 23. Fig. 6 is a view in section across the surface of one of the finer portions or crinkles, and indicates the fibers in compact arrangement; whereas Fig. 7 is a similar view of the coarser portion, and indicates the fibers of the web, at this portion, as in looser and more separated arrangement.

While the invention has been described in connection with the embodiment herein shown, it will be understood that I do not wish to be understood as limiting the inventive concept to the precise form of this disclosure or method of execution, as many changes in the structure, operation, and arrangement of the parts are regarded as being within the scope of the invention: For instance, and as illustrated in Figs. 8 to 10, I may elect to produce in the web, as a step preliminary to the crinkling action of the structure already described, a longitudinal corrugating or crinkling of the web and whereby the resulting product (as shown in Fig. 11) will include not only the doctor-produced transverse crinkles but also longitudinal crinkles 24^a: The structure contemplated to produce such longitudinal crinkling, as illustrated in Figs. 8 to 10 more or less diagrammatically, includes, in juxtaposition to a stock or guide roll 25 (corresponding to the stock or guide roll 1 of the preferred embodiment) a crinkling device, generally marked 26, and comprising a stationary base-member 27 formed with a guide-way 28 in which an oscillatory carrier 29 has a sliding motion. This carrier includes a sustaining element 30, upstanding side-plates 31, and a pair of transverse shafts 32 and 33. On the shaft 32 is mounted a series of juxtaposed sleeves 33^a and from each of which extends an arm 34 carrying at its outer extremity a ball 35. The shaft 33 likewise carries a similar series of

sleeves 36 from each of which extends an arm 37 which carries at its extremity a ball 38. The series of balls 35 are disposed in staggered relation to the balls 38 and the two series are arranged in such relation to each other that, as the web passes from a suitable source of supply, it travels between the two sets of ball-carrying fingers 34 and 37 so that the balls 35 press the web downwardly while the balls 38 press it upwardly, with the result that longitudinal grooves are formed in the web preliminary to passing the same over the guide-roll 25 into a liquid-containing pan 39, (corresponding to the pan 3 already described), after which is passes around a roll 40 (corresponding to the roll 4 of the other embodiment) and by which the web is moistened before it is pressed against the surface of a receiving-roll 41 (corresponding to the aforementioned receiving-roll 5) after which it is acted upon by a squeeze-roll 42 (corresponding to the aforementioned roll 6).

The width of the web is materially decreased by the pleating action of the balls 35 and 38 and for this reason the effect of the rolls 25, 40 and 41 on the web is to compress the pleats into crinkles as they pass thereover.

The carrier 29 is oscillated in respect to the traveling web in order that the corrugating balls 35 and 38 may be shifted back and forth and thereby produce a sinuous corrugation in the web. Such movement of the carrier is produced by a crank 43 suitably connected to the carrier and receiving motion from a shaft 44 which is connected to a prime mover (not shown).

The sleeves 33 and 36, respectively, are provided with circumferential notches 45, 45, and 46, 46 respectively, and in these dogs 47 and 48, respectively, are adapted to be inserted and whereby ball-carrying fingers may be adjusted for the purpose of regulating the size of the crinkles or the amount of stretch or elasticity to be effected in the web. The mounting of the balls 35 on the fingers 34 includes a ball-bearing 49, as shown in Fig. 10, and the balls 38 are similarly mounted on the fingers 37. By this construction, the balls are permitted a free rotative movement.

What I claim is:—

1. The herein-described method of manufacturing crepe, which consists in moving a web of material over a supporting surface and, while in motion, treating the same to automatically varying crinkling action by varying the rate of removal of the web from the supporting surface.

2. A method of producing crepe which consists in moving a web of material over a supporting surface, pressing the web while in motion, and causing a varying differential movement between different sections of the web by varying the rate of removal of the web from the supporting surface to form crinkles of varying density.

3. Apparatus for producing crepe, including a movable supporting surface, a scraper associated therewith for scraping the web from the surface, and means for moving the scraper in relation to the surface during the scraping operation for varying the density of the web at different portions thereof.

4. Apparatus for producing crepe which includes a moving surface for supporting a web of material, a blade associated therewith, and means for changing the angularity of the blade in respect to the surface of the moving web, the change of angle being effected during the movement of the web.

5. Apparatus for producing crepe including a support for a moving web of material, means for pressing the web upon the support, means for removing the web from the surface of the support by a scraping action and comprising a blade, and means for changing the angle of the blade with relation to the surface of the web during the scraping of the web from the support.

6. Apparatus for producing crepe including a moving surface for supporting a web of material, means for pressing the web upon the moving surface, a scraping-instrumentality for removing the web from the surface, and means for effecting movement of the scraping-instrumentality with relation to the moving surface during the scraping operation.

7. Apparatus for producing crepe including a moving surface for supporting a web of material, means for pressing the web upon the moving surface, a scraping-instrumentality for removing the web from the surface, means for effecting movement of the scraping-instrumentality with relation to the moving surface during the scraping operation, and for changing the angle of incidence with which the scraping instrumentality meets a portion of the web during the scraping operation.

8. Mechanism for producing crepe comprising a web-carrying surface, a scraping-instrumentality operatively associated therewith and comprising a scraper, and means for moving the scraper with relation to the surface at predetermined intervals during movement of the surface.

9. Mechanism for producing crepe comprising a web-carrying surface, a scraping-instrumentality operatively associated therewith for removing material therefrom, and means for changing the position of the scraping-instrumentality in relation to the carrying surface of the web during the material-removing operation.

10. Mechanism for producing crepe comprising a web-carrying surface, a scraping-instrumentality operatively associated there-

with for removing material therefrom, and means for automatically changing the position of the scraping-instrumentality in relation to the carrying surface of the web during the material-removing operation.

11. Mechanism for producing crepe including a web-carrying surface, an instrumentality for scraping a web of material from the surface, and means for automatically changing the position of the scraping instrumentality with relation to the surface of the web.

12. Mechanism for producing crepe including a web-carrying surface, a scraping-instrumentality associated therewith and effecting a scraping operation, and means for reciprocating the scraping-instrumentality with relation to the web-carrying surface during the scraping operation.

13. A crepe-producing mechanism including a web-carrying surface, a doctor-blade, and means for automatically moving the doctor-blade with relation to the web-carrying surface.

14. A crepe-producing mechanism including a web-carrying surface, a doctor-blade, means for automatically moving the doctor-blade with relation to the web-carrying surface, said means including a support for the doctor-blade, and an eccentric forming a component of said support.

15. A crepe-producing mechanism including a web-carrying surface, a doctor-blade, means for automatically moving the doctor-blade with relation to the web-carrying surface, said means including a support for the doctor-blade, an eccentric forming a component of said support, and means for moving the eccentric.

16. A crepe-producing mechanism including a web-carrying surface, a doctor-blade, means for automatically moving the doctor-blade with relation to the web-carrying surface, said means including a support for the doctor-blade, an eccentric forming a component of said support, means for moving the eccentric, and including a shaft, a connection between the eccentric and the shaft, and means for rotating the shaft.

17. A crepe-producing mechanism comprising a web-carrying surface, means for moving the same, a doctor-blade operatively associated with the surface for scraping a web of material therefrom and a movable support for the doctor-blade including a shaft, an eccentric driven from the shaft, and blade-carrying means connecting the eccentric and blade.

18. A crepe-producing mechanism comprising a web-carrying surface, means for moving the same, a doctor-blade operatively associated with the surface for scraping a web of material therefrom, and means for producing a reciprocatory movement of the doctor-blade during the scraping operation.

19. A crepe-producing mechanism comprising a web-carrying surface, means for moving the same, a doctor-blade operatively associated with the surface for scraping a web of material therefrom, means for producing a reciprocatory movement of the doctor-blade during the scraping operation and comprising an eccentric, and a connection between the eccentric and the blade.

20. A crepe-producing mechanism comprising a web-carrying surface, means for moving the same, a doctor-blade operatively associated with the surface for scraping a web of material therefrom, means for producing a reciprocatory movement of the doctor-blade during the scraping operation and comprising an eccentric, a connection between the eccentric and the blade, and means for adjusting the sweep of movement of the blade.

21. A new article of manufacture comprising crepe having substantially longitudinal compressed crinkles and cross-crinkles of varying degrees in relatively different arrangement.

22. The herein-described method of producing crepe which consists in treating a web of material to effect substantially longitudinal crinkles therein and, as a successive step, to effect cross-crinkles of a comparatively coarse character upon a predetermined portion of the web and then, in a longitudinally succeeding portion, cross crinkles of a relatively finer character.

23. The herein-described method of manufacturing crepe which consists in moving a web of material and, while in motion, producing therein substantially longitudinal sinuous crinkles, then subjecting the web, while still in motion, to a moistening action, and then, while the web is continuing in motion, treating the same to a duplex crinkling action.

24. Apparatus for producing crepe including a base-member, an oscillating carrier movable thereon, means for effecting movement of the carrier, two sets of ball-carrying fingers on the carrier, a guide-roll associated with the carrier, a supporting roll associated with the guide-roll, a blade associated with the supporting roll, and means for changing the angularity of the blade in respect to the surface of the web.

25. Apparatus for producing crepe which includes a movable supporting surface, a scraper associated therewith for scraping the web from the surface, means for moving the scraper in relation to the surface during the scraping operation for varying density of the web at different portions thereof, and means for producing a crinkling action in the web preliminary to the action of the blade.

26. Apparatus for producing crepe which includes a movable supporting surface, a

scraper associated therewith for scraping the web from the surface, means for moving the scraper in relation to the surface during the scraping operation for varying density of the web at different portions thereof, means for producing a crinkling action in the web preliminary to the action of the blade, and mechanism for actuating said crinkling-producing means for varying its action.

27. The herein-described method of manufacturing crepe which consists in moving a web of material in unmoistened condition and, while in motion, producing therein substantially longitudinal sinuous crinkles, and subsequently moistening the web.

28. The herein-described method of manufacturing crepe which consists in moving a web of unmoistened material and, while in motion, subjecting the web to forming pressure on each side thereof to produce substantially longitudinal, sinuous crinkles therein.

29. Apparatus for producing crepe including a base-member, an oscillating carrier movable thereon, two sets of ball-carrying fingers on the carrier, and means for drawing a web of material between said sets of fingers.

30. Apparatus for producing crepe including a base-member, an oscillating carrier movable thereon, two sets of ball-carrying fingers on the carrier, means for drawing a web of material between said sets of fingers, and means for effecting movement of the carrier.

31. Apparatus for producing crepe including a base-member, an oscillating carrier movable thereon, two sets of ball-carrying fingers on the carrier, means for drawing a web of material between said sets of fingers, and means for effecting movement of the carrier in a direction transverse to the direction of travel of the web of material.

32. Apparatus for producing crepe including a base-member, an oscillating carrier movable thereon, two sets of ball-carrying fingers on the carrier, means for drawing a web of material between said sets of fingers, and means for effecting reciprocatory movement of the carrier.

In testimony whereof I affix my signature.

WILLIAM H. CANNARD.