July 24, 1934. J. C. CORCORAN 1,967,609

PROCESS OF DRYING CRINKLE OR CREPE PAPER

Filed Sept. 12, 1931

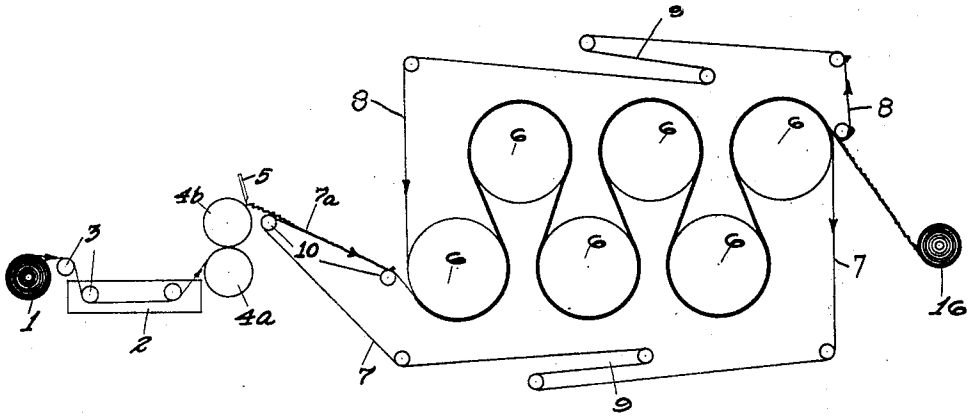


Fig. 1.

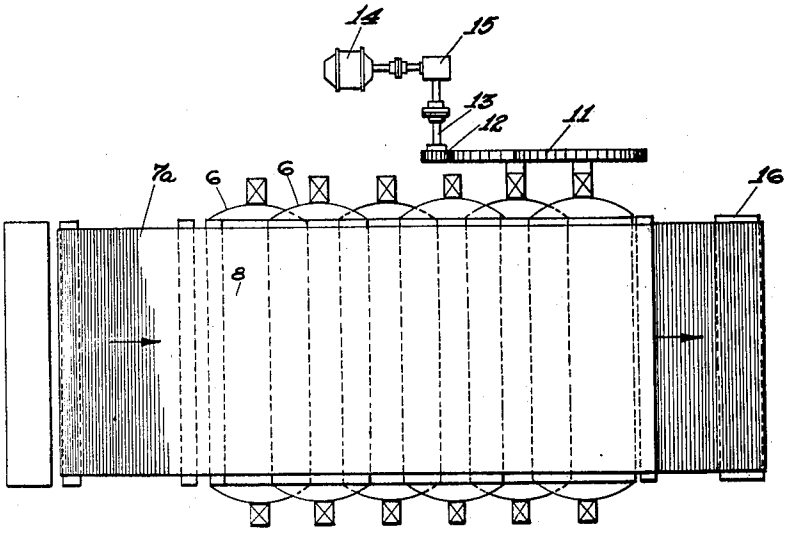


Fig. 2.

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Patented July 24, 1934 1,967,609

UNITED STATES PATENT OFFICE

1,967,609

PROCESS OF DRYING CRINKLE OR CREPE PAPER

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Application September 12, 1931, Serial No. 562,595

2 Claims. (Cl. 34—24)

The present invention relates to the manufacture of crinkle or crepe papers, that is, papers having a crinkle or crepe effect imparted thereto, usually as a result of the removal of the paper from a "creping" roll, while in a moist condition, by means of a suitable scraper or doctor.

The object of the invention is to provide an improved process and machine for drying crinkle or crepe papers in such a manner that the amount of crinkle or crepe effect originally imparted to the moist paper is not altered in any way while the drying is in progress.

In the previous manufacture of crinkle or crepe papers, difficulties have been encountered in drying the crinkled paper as it comes from the creping roll in a moist condition, due to the tendency of the paper to elongate in the direction of its travel. Obviously any such elongation of the paper results in separation of the minute creases, or crinkles, formed as the paper leaves the creping roll, so that the resulting product, when finally dried, does not possess the desired degree of creping and softness.

According to the present invention, the difficulties that have heretofore been encountered in the drying of crinkle or crepe papers are eliminated by subjecting the moist crinkled paper to the action of an improved drying apparatus that handles the paper without submitting it to any pull or tension throughout the drying operation. Briefly stated, the invention consists in delivering the moist crinkled paper, by gravity, to a pair of drying aprons moving in unison at a speed less than the delivery speed of the paper, the aprons conveying the crinkled paper between them without any possibility of elongation or distortion, while at the same time effectively removing moisture therefrom by the application of heat. The invention further contemplates an improved arrangement for driving the drying aprons in such a manner that the driving force is applied to the aprons only at the end of the machine farthest removed from the creping roll, thereby substantially eliminating any possibility of the aprons themselves exerting any pull on the paper therebetween. The above and other advantageous features of the invention will hereinafter more fully appear from the following description with reference to the accompanying drawing, in which:

Fig. 1 is a diagrammatic view illustrating the construction of a machine for carrying out my improved process of drying.

Fig. 2 is a plan view of the parts shown in Fig. 1, and illustrating the manner of driving the drying aprons.

Like reference characters refer to like parts in the different figures.

Referring first to Fig. 1, the supply of paper to be crinkled is represented for purposes of illustration by a roll 1 rotatably mounted adjacent to a bath 2 containing a suitable liquid with which it is desired to moisten the paper in advance of the creping operation. The web of paper from the roll 1 passes over and under suitable guide rolls 3 which convey it through the bath 2 and deliver it to a pair of pressure rolls 4*a* and 4*b*. As the moistened paper passes between the pressure rolls 4*a* and 4*b*, excess moisture is removed therefrom and the remaining moisture evenly distributed, the paper web clinging to the upper half of the top pressure roll 4*b* as it leaves the rolls. The upper pressure roll 4*b*, hereinafter termed the creping roll, has cooperating therewith a doctor or scraper 5 which strips the moistened paper from the upper surface of the roll so as to impart a crinkled or crepe effect thereto as it is delivered to a drying apparatus which constitutes the present invention.

The drying apparatus consists of a number of rotatably mounted drying cylinders 6, 6 arranged in staggered relation, the cylinders being adapted to be heated in any suitable manner, as by the admission of steam thereto. Around these cylinders 6 pass endless drying aprons 7 and 8 preferably composed of felt. The aprons 7 and 8 pass back and forth between and around the cylinders 6, in contact throughout, suitable tension devices 9, 9 being provided above and below the cylinders for keeping the aprons taut. The lower apron 7 extends upwardly beyond the front cylinder 6 where it passes around guide rolls 10, the uppermost portion of the apron 7 terminating just below the point where the doctor 5 cooperates with the surface of the crepe roll 4*b*. The apron 7 thus provides a downwardly moving receiving portion 7*a* of considerable length extending at a steep angle between the point where the crinkled paper 1 leaves the creping roll 4*b* and the bight between the aprons 7 and 8 where they pass around the first drying cylinder 6.

Referring now to Fig. 2, there is shown an arrangement for driving the drying cylinders 6, 6 around which pass the aprons 7 and 8. In this arrangement, only the upper and lower cylinders 6 farthest removed from the creping roll 4*a* are connected together by intermeshing gears

11 which are in turn driven from a pinion 12. The pinion 12 is carried by a shaft 13 connected to a driving motor 14 through suitable reduction gearing 15. With only the last two cylinders 6 positively driven from the motor 14 through the gears 11, all of the remaining cylinders 6 act as idlers and exert no pull whatsoever on the aprons, the purpose of which will hereinafter more fully appear with reference to the operation of the apparatus.

In carrying out the process of the present invention by means of the arrangement of apparatus described above, the web of crinkled paper 1, as stripped from the creping roll 4*b* by the doctor 5, drops by gravity upon the downwardly moving receiving portion 7*a* of the lower apron 7. The amount of crinkling or crepe effect imparted to the paper is dependent directly upon the difference between the peripheral speed of the creping roll 4*b* and the lineal speed of the lower apron 7. With the creping roll 4*b* driven at a higher speed than the apron 7, crinkling of the moist paper as it is stripped from the roll 4*b* necessarily follows, and obviously the greater this difference in speed is, the greater the resulting creping effect will be. Since the crinkled paper drops by gravity from the creping roll 4*b* to the receiving portion 7*a* of the apron, moving downwardly at a speed less than the delivery speed of the paper, there is no possibility of stretching or elongating the crinkled paper at the point of transfer, and this condition is maintained throughout the travel of the crinkled paper through the drier.

It is evident from a consideration of Fig. 1 that movement of the receiving portion 7*a* of the apron in the direction of the arrow will carry the web of crinkled paper into the bight between the two aprons 7 and 8, as the aprons pass around the periphery of the lowermost drying cylinder 6. As the web of crinkled paper enters between the aprons with the degree of creping initially imparted thereto at the creping roll 4, the paper is held between the apron surfaces moving at the same speed, so that there is no possibility of any pull being exerted on the paper to spread apart its crinkles as the aprons pass back and forth between the drying cylinders 6.

As previously pointed out, the crinkled paper when leaving the creping roll 4*b*, carries a considerable percentage of moisture evenly distributed by the pressure of the rolls 4*a* and 4*b*, and this moisture is extracted from the paper by the absorbent aprons as the paper passes through the apparatus. Due to the arrangement of the drying cylinders 6, one above the other, it is evident that first one side and then the other of the paper web is curved about a cylinder, so that the drying takes place evenly, due to the reversal of the paper with respect to the heated surface of the cylinders. Throughout the travel of the crinkled paper web between the aprons it is never subjected directly to the heated surface of a cylinder, due to the presence of one or the other of the interposed aprons 7 and 8 which rapidly extract the moisture from the paper as they are heated by contact with the cylinders. During the travel of the aprons, the evaporation of the moisture extracted by each apron is carried out evenly, since portions of first the upper and then the lower aprons are alternately exposed to the heated periphery of a cylinder 6 and then to the air, as the aprons pass back and forth between the cylinders. Due to this action, the aprons are maintained in uniform condition during the operation of the apparatus, with the result that they always exert the same drying effect on the crinkled paper carried therebetween.

From a consideration of the foregoing, it is evident that by the time the web of crinkled paper has passed through the apparatus and leaves the aprons at their point of separation for winding on a take-up roll 16, all moisture has been removed therefrom. Furthermore, since the paper has not been subjected to any pull in its travel from the creping roll 4*b*, the dried paper possesses the same degree of crinkle or crepe effect as originally imparted thereto while in a moist condition. This result is absolutely assured by the fact that the speed of the aprons 7 and 8 remains uniform throughout their travel, with no possibility of the aprons exerting a pulling effect on the crinkled paper while in a moist condition. As previously pointed out, only the last two cylinders farthest removed from the creping roll are positively driven, so that all the other cylinders merely act as idlers during the travel of the aprons. Therefore, these freely rotatable cylinders exert no pull whatsoever on the aprons, even though variations in the cylinder diameters may result from heating of the same.

In the practice of my invention it has been found that the drying of the crinkled paper while held between the aprons is accompanied by a felting effect due to the pressure exerted by the aprons as they pass around the cylinders, so that the dried paper possesses a smooth or velvety quality, with a surface that can be readily printed upon. This action of the aprons also increases the tensile strength of the dried paper, as well as its moisture absorbing qualities, thereby rendering the resulting product well suited for use as toweling.

I claim,

1. A process of drying crinkle or crepe paper, which consists in depositing the moist paper on an apron immediately after forming the crinkles therein, said apron moving at such a speed as to prevent elongation of crinkles in the paper and then drying the paper while continously confined between the first apron and a second apron moving in the same direction and at the same speed as the first apron.

2. A process of drying crinkle or crepe paper, which consists in depositing the moist paper on an apron immediately after forming the crinkles therein, said apron moving at such a speed as to prevent elongation of crinkles in the paper and then drying the paper while continuously confined between the first apron and a second apron moving in the same direction and at the same speed as the first apron, both of said aprons moving at a lineal speed less than the delivery speed of the paper.

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