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J. ARKELL, DEC'D.

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PROCESS OF MAKING STRETCHABLE PAPER.

APPLICATION FILED DEC. 21, 1901.

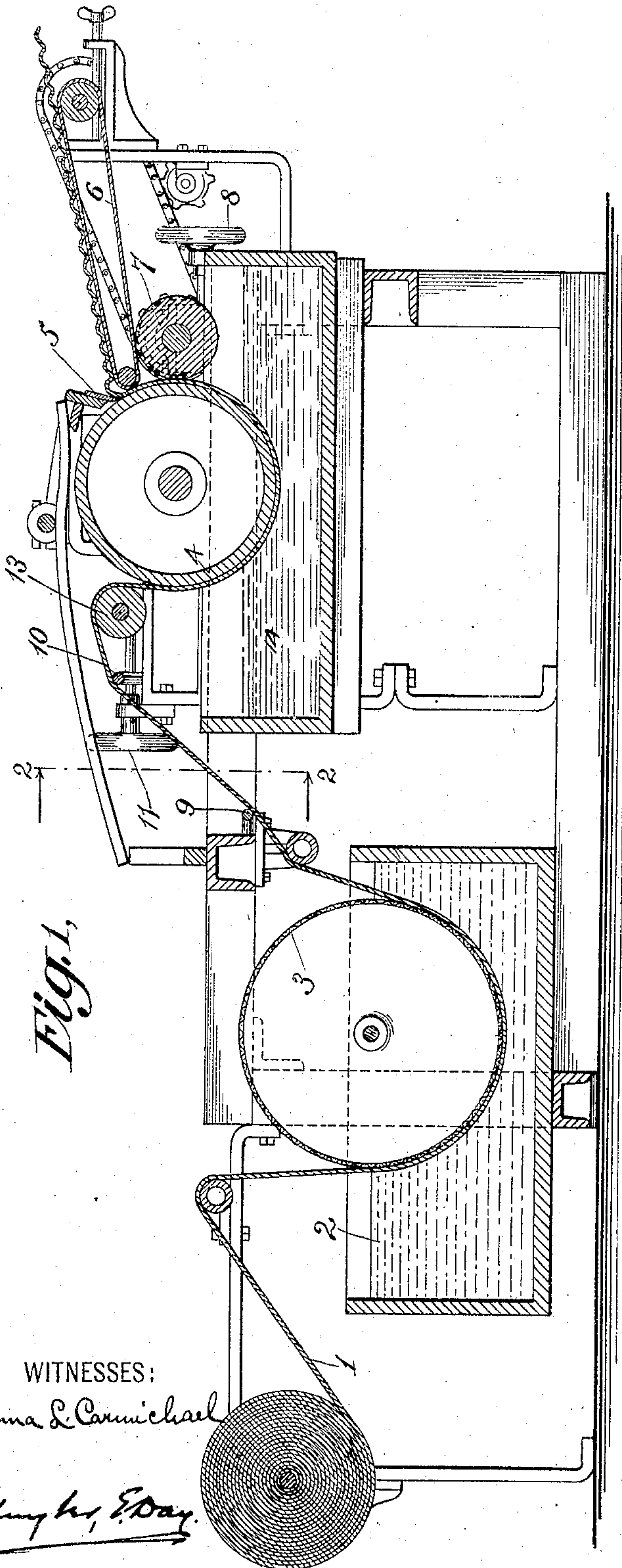


Fig. 1,

WITNESSES:

Emma L. Carmichael

Schuyler, E. Day.

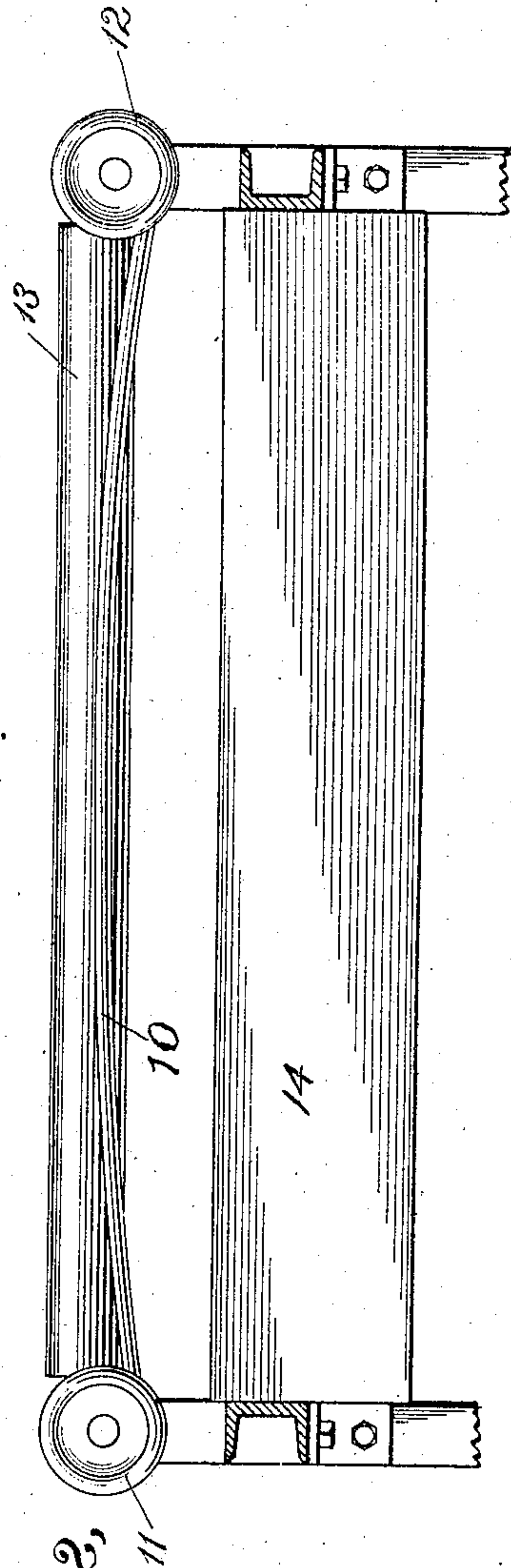


Fig. 2,

James Arkell INVENTOR

BY Nicholas M. Goodlett Jr. ATTORNEY



# UNITED STATES PATENT OFFICE.

JAMES ARKELL, OF CANAJOHARIE, NEW YORK; WILLIAM J. ARKELL  
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DECEASED.

## PROCESS OF MAKING STRETCHABLE PAPER.

SPECIFICATION forming part of Letters Patent No. 790,021, dated May 16, 1905.

Application filed December 21, 1901. Serial No. 86,829.

*To all whom it may concern:*

Be it known that I, JAMES ARKELL, a citizen of the United States, and a resident of Canajoharie, in the county of Montgomery and State of New York, have invented a certain new and useful Process of Making Stretchable Paper such as is Suitable for Wrapping or Packing Purposes, of which the following is a specification.

10 This invention relates to a process for making stretchable paper of comparatively durable grade, such as will be suitable for wrapping or packing purposes.

15 The invention seeks to provide a paper of the grade stated that shall be capable of withstanding strains such as may be put upon it when in use and which wrapping or packing paper as heretofore made is not capable of enduring without breaking. This purpose is accomplished in accordance with the present invention by forming in the paper fine, deep, and tight creases or crinkles, which enable the paper to stretch when under strain, so that the paper does not break.

25 In carrying out the invention I start with a suitable finished paper, which when crinkled will be adapted for use as a wrapping or packing paper. This paper is then passed through a saturating-bath of suitable liquid, such as water, whereby the paper is thoroughly saturated. The wet paper is then deposited upon a smooth-surfaced roller, to which it is made closely to adhere, and is carried by said roller against an obstruction, such as a doctor-blade. 35 This obstruction or doctor-blade crowds the wet paper back against itself, and thereby forms crinkles in the paper, which is thereafter removed and dried, so that the crinkles become permanent in the paper and render the paper stretchable. 40

45 Prior to this invention there has been no way of increasing the resistance of the heavier grades of paper to strains except by using a better and more expensive quality of paper-stock or by using a greater amount of paper-stock and making thus a thicker heavier paper. In such cases, however, the paper is substantially if not absolutely unyielding and non-stretchable, and is therefore liable to rup-

ture when put under sudden sharp strains. 50 The product resulting from the present invention, however, greatly increases the power of the paper to resist breaking strains, especially when these strains are confined to isolated areas of greater or less extent, and this is done without employing a better quality of paper-stock or more paper-stock. In fact, the invention makes it possible to start with paper made from paper-stock of poorer quality or less in quantity, or both, and yet obtain a 60 resulting product—that is, crinkled wrapping or packing paper—which is far superior to uncrinkled paper when made out of paper-stock better in quality and greater in amount.

The process is most conveniently carried 65 out in connection with an apparatus shown in the accompanying drawings, which form a part of this specification. This apparatus will now be described, and in connection therewith the process will be more fully set forth 70 in detail.

Figure 1 is a central vertical sectional elevation of such apparatus. Fig. 2 is a sectional elevation of the same, taken on the line 2 2 of Fig. 1. 75

The paper 1 in the form of a web is most conveniently taken from a roll and carried thence through a saturating-bath 2. In passing through this bath 2 the paper is most conveniently carried on a perforated roller 3, which 80 depresses the paper into the bath and allows thorough access of the water to the paper. After emerging from the bath the paper is deposited upon a smooth-surfaced roller 4, against which it is made to closely adhere by 85 the roller 7 rotating in contact with the roller 4. The roller 4 is preferably made of iron or other metal, and the roller 7 is preferably covered with rubber. As the paper moves forward with the roller 4 it comes in contact 90 with the doctor 5, which strips the paper from the roller 4 and at the same time crowds the paper back against itself, and so forms the crinkles in the paper. The paper is then carried away by the belt 6 and dried, so as to 95 make permanent the crinkles formed in the paper, and thereby render the paper elastic or stretchable. The roller 7 serves to press



the paper close upon the roller 4, so as to make it closely adhere to the roller with such tenacity as will enable the doctor to crowd the paper back against itself, and thereby crinkle it. It also serves to remove the surplus moisture in the paper. It is important that the paper contain the right amount of moisture before it reaches the doctor 5. If there is either too much moisture or too little moisture, the crinkles will not be properly formed in the paper by the doctor. It is also important that the wet paper be pressed in sufficiently close adherence to the roller 4 to enable the doctor to form the crinkles in the paper. For the purpose of regulating this moisture and this pressure the roller 7 is made adjustable to and from the roller 4 by means of hand-wheels, one of which is the wheel 8. Of course it is not essential to the process that the surplus moisture be removed from the paper at the same time the wet paper is pressed in close adherence to the roller 4; but it is preferable to accomplish these steps at the same time and by the same agency. As the paper emerges from the bath 2 it is liable to have longitudinal wrinkles therein, caused by the expansion of the paper, due to the moisture absorbed. For the purpose of removing these wrinkles the wet paper is extended laterally at some stage before it reaches the doctor 5. This lateral extension of the paper is preferably accomplished before the paper is deposited upon the roller 4. The means which I find efficient for this purpose consists of one or more curved bars or rods over which the paper is passed. In the apparatus shown in the drawings two of these bars 9 and 10 are shown. They serve to efficiently smooth out the paper by extending it laterally, and so remove the wrinkles.

11 and 12 are two hand-wheels for adjusting the iron roller 13, which guides the paper onto the roller 4 and which adjusts its tension.

I generally prefer to rotate the roller 4 within a second bath 14, thereby insuring an efficient saturation of the paper when the latter is made to move swiftly through the apparatus. In place of the bath 14 other means may be used for wetting the paper while on the roller 4.

Various changes in the several steps of the process and in their sequence may be made without departing from the scope of the invention.

What I desire to secure by Letters Patent is—

1. The process of making stretchable paper suitable for wrapping or packing purposes which consists in passing suitable finished paper through a saturating-bath; thereafter depositing the paper in a wet state upon a smooth-surfaced roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and removing and drying the paper

thus crinkled and thereby making the crinkles permanent and rendering the paper stretchable.

2. The process of making stretchable paper suitable for wrapping or packing purposes which consists in passing suitable finished paper through a saturating-bath; depositing the paper in a wet state upon a smooth-surfaced roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper, the surplus moisture in the paper being removed before it is crinkled; and removing and drying the paper thus crinkled and thereby making the crinkles permanent and rendering the paper stretchable.

3. The process of making stretchable paper suitable for wrapping or packing purposes which consists in passing suitable finished paper through a saturating-bath; depositing the paper in a wet state upon a smooth-surfaced roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and removing and drying the paper thus crinkled and thereby making the crinkles permanent and rendering the paper stretchable, the wet paper being extended laterally before being crinkled.

4. The process of making stretchable paper suitable for wrapping or packing purposes which consists in passing suitable finished paper through a saturating-bath; depositing the paper in a wet state upon a smooth-surfaced roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and removing and drying the paper thus crinkled and thereby making the crinkles permanent and rendering the paper stretchable, the wet paper being extended laterally and the surplus moisture therein being removed before the paper is crinkled.

5. The process of making stretchable paper suitable for wrapping or packing purposes which consists in passing suitable finished paper through a saturating-bath; depositing the paper in a wet state upon a smooth-surfaced roller; removing the surplus moisture from the paper while on said roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and removing and drying the paper thus crinkled and thereby making the crinkles permanent and rendering the paper stretchable.

6. The process of making stretchable paper suitable for wrapping or packing purposes which consists in passing finished paper through a saturating-bath; depositing the paper in a wet state upon a smooth-surfaced roller; removing the surplus moisture from the paper while on said roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in



the paper; and drying the paper thus crinkled and thereby making the crinkles permanent and rendering the paper stretchable, the wet paper being extended laterally before being crinkled.

7. The process of making stretchable paper suitable for wrapping or packing purposes which consists in passing suitable finished paper through a saturating-bath; extending the wet paper laterally; depositing the paper, previously extended, in a wet state on a smooth-surfaced roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and removing and drying the paper thus crinkled and thereby making the crinkles permanent and rendering the paper stretchable.

8. The process of making stretchable paper suitable for wrapping or packing purposes which consists in passing suitable finished paper through a saturating-bath; extending the wet paper laterally; depositing the paper, previously extended, in a wet state upon a smooth-surfaced roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper, the surplus moisture being removed before it is crinkled; and removing and drying the paper thus crinkled and thereby making the crinkles permanent and rendering the paper stretchable.

9. The process of making stretchable paper suitable for wrapping or packing purposes which consists in passing suitable finished paper through a saturating-bath; depositing the paper in a wet state upon a smooth-surfaced roller; extending the wet paper laterally; removing the surplus moisture from the paper while on said roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and removing and drying the paper thus crinkled and thereby making the crinkles permanent and rendering the paper stretchable.

10. The process of making stretchable paper suitable for wrapping or packing purposes which consists in passing suitable finished paper through a saturating-bath; depositing the paper in a wet state upon a smooth-surfaced roller; wetting the paper again while on said roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and removing and drying the paper thus crinkled and thereby making the crinkles permanent and rendering the paper stretchable.

11. The process of making stretchable paper suitable for wrapping or packing purposes which consists in passing suitable finished paper through a saturating-bath; depositing the paper in a wet state upon a smooth-surfaced roller; passing the paper while on said roller through a second bath; crowding the wet paper back against itself while adhering to said

roller and thereby forming crinkles in the paper; and removing and drying the paper thus crinkled and thereby making the crinkles permanent and rendering the paper stretchable.

12. The process of making stretchable paper suitable for wrapping or packing purposes which consists in passing suitable finished paper through a saturating-bath; depositing the paper in a wet state upon a smooth-surfaced roller; wetting the paper again while on said roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and removing and drying the paper thus crinkled and thereby making the crinkles permanent and rendering the paper stretchable, the wet paper being extended laterally and the surplus moisture therein being removed before the paper is crinkled.

13. The process of making stretchable paper suitable for wrapping or packing purposes which consists in passing finished paper through a saturating-bath; depositing the paper in a wet state upon a smooth-surfaced roller; removing the surplus moisture from the paper while on said roller; passing the paper while on said roller through a second bath; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and drying the paper thus crinkled and thereby making the crinkles permanent and rendering the paper stretchable, the wet paper being extended laterally before being crinkled.

14. The process of making stretchable paper suitable for wrapping or packing purposes which consists in wetting the paper; depositing it in a wet state upon a smooth-surfaced roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and removing and drying the paper thus crinkled and thereby making the crinkles permanent and rendering the paper stretchable, the wet paper being extended laterally before it is crinkled.

15. The process of making stretchable paper suitable for wrapping or packing purposes which consists in wetting the paper; depositing it in a wet state upon a smooth-surfaced roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and removing and drying the paper thus crinkled and thereby making the crinkles permanent and rendering the paper stretchable, the wet paper being extended laterally and the surplus moisture therein being removed before it is crinkled.

16. The process of making stretchable paper suitable for wrapping or packing purposes which consists in wetting the paper; depositing it in a wet state upon a smooth-surfaced roller; removing the surplus moisture from



the paper while on said roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and removing and drying the paper thus crinkled and thereby making the crinkles permanent and rendering the paper stretchable, the wet paper being extended laterally before it is crinkled.

17. The process of making stretchable paper suitable for wrapping or packing purposes which consists in wetting the paper; depositing it in a wet state upon a smooth-surfaced roller; passing the paper while on said roller through a second bath; removing the surplus moisture from the paper while on said roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and removing and drying the paper thus crinkled and thereby making the crinkles permanent and rendering the paper stretchable, the wet paper being extended laterally before it is crinkled.

18. The process of making stretchable paper suitable for wrapping or packing purposes which consists in passing suitable finished paper through a saturating-bath on a roller; extending the wet paper laterally; depositing it in a wet state on a smooth-surfaced roller; passing the paper while on said roller through a second bath; squeezing the paper against said roller as it emerges from said second bath and thereby removing the surplus moisture; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and removing and drying the paper thus crinkled and thereby making the crinkles permanent and rendering the paper stretchable.

19. The process of making stretchable paper such as is suitable for wrapping or packing purposes which consists in wetting finished paper; depositing it in a wet state upon a smooth-surfaced roller; thereafter squeezing it in close adherence to said roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and drying the paper thus crinkled and rendering the crinkles permanent and the paper stretchable.

20. The process of making stretchable paper such as is suitable for wrapping or packing purposes which consists in wetting finished paper; depositing it in a wet state upon a smooth-surfaced roller; thereafter squeezing it in close adherence to said roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and drying the paper thus crinkled and rendering the crinkles permanent and the pa-

per stretchable, the wet paper being extended laterally before it is crinkled.

21. The process of making stretchable paper such as is suitable for wrapping or packing purposes which consists in passing finished paper through a saturating-bath; depositing it in a wet state upon a smooth-surfaced roller; thereafter squeezing it in close adherence to said roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and drying the paper thus crinkled and rendering the crinkles permanent and the paper stretchable.

22. The process of making stretchable paper such as is suitable for wrapping or packing purposes which consists in passing finished paper through a saturating-bath; depositing it in a wet state upon a smooth-surfaced roller; thereafter squeezing it in close adherence to said roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and drying the paper thus crinkled and rendering the crinkles permanent and the paper stretchable, the wet paper being extended laterally before it is crinkled.

23. The process of making stretchable paper such as is suitable for wrapping or packing purposes which consists in wetting finished paper; depositing it in a wet state upon a smooth-surfaced roller; wetting the paper again while on said roller; thereafter squeezing it in close adherence to said roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and drying the paper thus crinkled and rendering the crinkles permanent and the paper stretchable.

24. The process of making stretchable paper such as is suitable for wrapping or packing purposes which consists in passing finished paper through a saturating-bath; depositing it in a wet state upon a smooth-surfaced roller; wetting the paper again while on said roller; thereafter squeezing it in close adherence to said roller; crowding the wet paper back against itself while adhering to said roller and thereby forming crinkles in the paper; and drying the paper thus crinkled and rendering the crinkles permanent and the paper stretchable.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES ARKELL.

Witnesses:

GEORGE H. SMITH,  
E. B. BURNAP.