No. 686,879. Patented Nov. 19, 1901.

B. ARKELL.

PROCESS OF MAKING CRINKLED PAPER.

(Application filed May 17, 1901.)

(No Model.) 2 Sheets—Sheet 1.

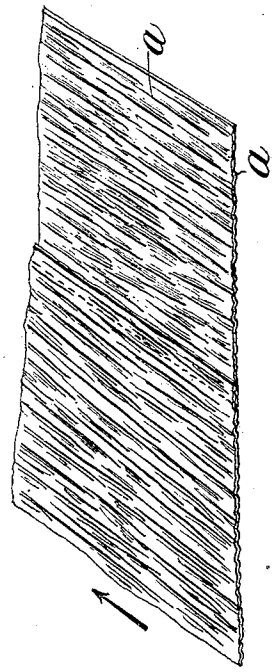


Fig. 1.

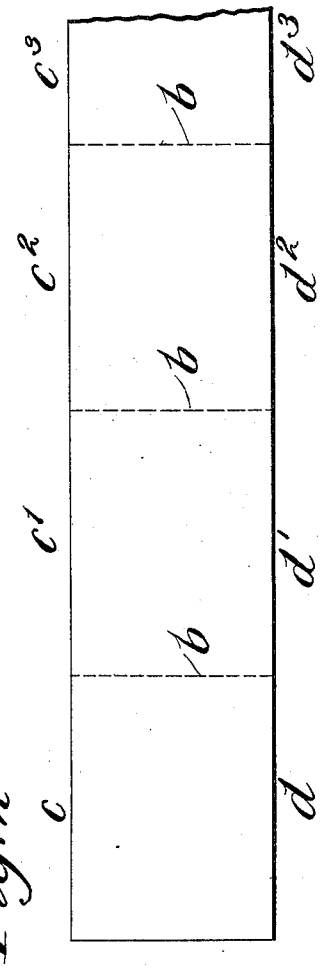


Fig. 2.

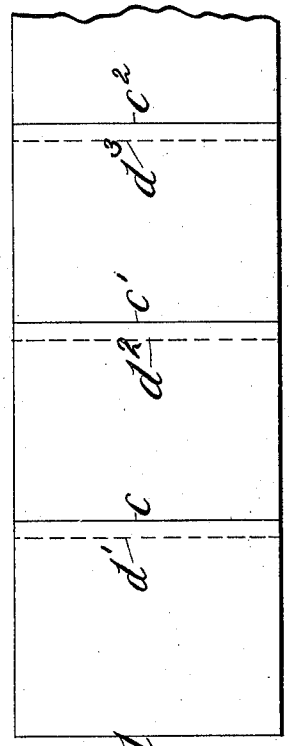


Fig. 3.

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Fig. 5.

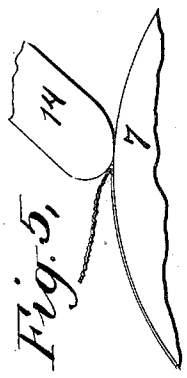


Fig. 4.

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PROCESS OF MAKING CRINKLED PAPER.

SPECIFICATION forming part of Letters Patent No. 686,879, dated November 19, 1901.

Application filed May 17, 1901. Serial No. 60,630. (No specimens.)

To all whom it may concern:

Be it known that I, BARTLETT 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 new and useful Process of Making Crinkled Paper Fabric, of which the following is a specification.

This invention relates to a new and improved process for making a paper fabric suitable for wrapping and packing purposes.

The invention seeks as a result of the process to produce a paper fabric that shall have the maximum capacity to maintain itself against strains which tend to rupture it and which shall be serviceable for wrapping and packing purposes.

In the drawings forming part of this specification, Figure 1 represents a piece of crinkled paper fabric in perspective made in accordance with my invention, the thickness of the paper being somewhat exaggerated for the sake of clearness. Fig. 2 represents a web of paper of indefinite length before the same has been severed or crinkled. Fig. 3 represents the new web before it has been crinkled and consisting of sheets severed from the original web, said sheets having been turned around and pasted together. Fig. 4 is a side elevation of a suitable machine adapted for moistening and crinkling the new web, and Fig. 5 shows a large fragmental view of a detail in side elevation.

In carrying out the invention I procure or make a finished paper fabric, as shown in Fig. 2, and having the length of its constituent fibers running generally in the same direction. Such an arrangement of the fibers imparts to the paper the maximum tensile strength in direction of the length of the fibers, but leaves the paper more liable to rupture from strains in a direction transverse to the direction of the length of the fibers. For the purpose of increasing to the maximum the capacity of the paper to maintain itself against transverse strains I form in the paper a multiplicity of crinkles running generally in the same direction as the constituent fibers. These crinkles by reason of their direction do not break the fibers, and hence do not diminish the normal strength of the fibers. On the other hand, they enable the paper to stretch when under strains transverse to the direction of its fibers and crinkles, and so prevent the paper from breaking. When the fabric is under such transverse strain, the crinkles flatten out or unfold, and when the strain ceases the crinkles draw up again and the paper contracts. Thus by the arrangement of the constituent fibers generally in one direction and a multiplicity of crinkles in the same general direction I impart to the paper fabric the maximum capacity to maintain itself against strains which tend to rupture it.

The finished fabric is characterized by a pronounced elasticity in a direction transverse to the length of its crinkles and its constituent fibers.

The paper fabric in which I form the crinkles is such as is made ordinarily on a paper-machine in the form of a web and in which the length of the constituent fibers runs generally lengthwise of the web and as shown in Fig. 2. I sever this web, as shown in Fig. 2, into separate sheets on the dotted lines *b b b*, &c., and turn the sheets a quarter way around, bringing together the edges of the sheets which previously formed the side edges of the web and secure these edges together, preferably by pasting them permanently together. The new web thus formed (shown in Fig. 3) has its constituent fibers running in a direction generally transverse the web. Crinkles are now formed in the new web transverse thereof, and therefore in the same general direction as the length of the fibers.

In forming the crinkles in the web it is first moistened and while in this state is brought in contact with a doctor-blade or other suitable abutment, by means of which the fabric is turned back on itself at a sharp angle, thus forming the crinkles. In forming these crinkles in the web they are necessarily formed in a direction running transverse to the web. This is due to the necessary arrangement of the doctor transverse of the web. It will be seen from the foregoing that if a web of paper as ordinarily made and as shown in Fig. 2, with its constituent fibers having their length running lengthwise of the web, were crinkled by means of a doctor-blade or other suitable abutment the crinkles would be

formed transverse the length of the constituent fibers. It is for this reason that the original web shown in Fig. 2 is severed into sheets and the new web formed thereof. (Shown in Fig. 3.)

a designates the crinkles of the finished fabric shown in Fig. 1, which run, generally, in the same direction as the length of the fibers, as indicated by the arrow.

The original web of paper shown in Fig. 2 is traversed by dotted lines *b*, placed at convenient intervals to represent the length of the sheets into which the web is to be cut. These separate sheets may of course be of any suitable length, but must not be longer, of course, than the length of the doctor or other abutment by means of which the crinkles are to be formed.

c d and *c' d'* and c^2 d^2 and c^3 d^3 represent the side edges of the original web from which the separate sheets are to be severed. When the original web is cut up into separate sheets, these sheets are turned so that the edges *c* and *d'* may be secured together and so that the edges *c'* and d^2 may be secured together and so that the edges c^2 and d^3 may be secured together, thus forming a new web made up of severed sheets, as shown in Fig. 3. The new web is then passed through the machine shown in Fig. 4. I will now describe this machine.

A represents the framework of the machine, on the uprights of which, at one end thereof, bearings 1 are located for the reception of the journals of a drum 2, on which is wound the new web to be crinkled. A tank 3 for water (which is preferably kept warm or tepid in any suitable manner) is disposed under the horizontal portion of the framework. A felt-covered roller 4 is mounted in the framework and adapted to project into the water in the tank 3, and above the roller 4 another felt-covered roller 5 is mounted, said felt-covered rollers being adapted to rotate in close proximity to each other. The upper felt-covered roller 5 is also adapted to rotate in close proximity to a smooth metal roller 7, mounted in suitable bearings on the framework. A pulley 8 is secured to the shaft or journal of the roller 7 for the reception of a belt 9 from any convenient source of power. The shaft of the roller 7 is also preferably provided with a fly-wheel 10. A small roller 11 is also mounted in suitable bearings in close proximity to the metal roller 7 and at a point rearwardly of the axis of the latter. A standard 12 is mounted on the framework, and to this standard is secured an arm 13, which terminates above the metal roller 7. To the free end of the arm 13 a doctor or remover 14 or other suitable abutment is secured and adapted to bear at its lower end against the periphery of roller 7, said doctor or remover being disposed in an inclined position and made with a blunt or rounded lower end where it bears against the roller. The paper from the supply-roller passes first over a guide-roller 15 and then over the tension-roller 16, mounted above the water in the tank, and then backwardly and over the tension-roller 17, mounted to project into the water in the tank. From the roller 17 the paper passes through the warm or tepid water in the tank, whereby it becomes thoroughly moistened, then upwardly over the lower felt-covered roller 4, then between the two felt-covered rollers 4 and 5, whereby surplus moisture will be removed from the paper, and then upwardly between the upper felt-covered roller 5 and the metal roller 7, being guided over the latter by the small roller 11. The moist paper will adhere sufficiently to the smooth periphery of the metal roller to be carried onward as the latter rotates; but the paper is prevented from following the roller throughout its revolution by coming in contact with the abutment formed by the doctor. When the moist paper comes into contact with the portion of its rounded end which bears against the roller, it will be crowded back upon itself at a sharp angle while still on the roller, (see Fig. 5,) and when finally forced to leave the roller it will be crinkled, and the crinkled paper will pass back and over the small roller 11. The paper thus crinkled will be dried in any suitable manner, and so become the finished product.

What I claim as new, and desire to secure by Letters Patent, is—

1. The process of making a paper fabric for wrapping and packing purposes which consists in taking a web of suitable paper having the length of its constituent fibers running generally in the same direction and lengthwise the web and severing the web into separate sheets; attaching the sheets together to form a new web and so that the length of the constituent fibers will run transverse the newly-formed web; and forming crinkles in the web running in a direction generally transverse the web and in the same general direction as the length of the constituent fibers.

2. The process of making a paper fabric for wrapping and packing purposes which consists in taking a web of suitable paper having the length of its constituent fibers running generally in the same direction and lengthwise the web and severing the web into separate sheets; attaching the sheets together to form a new web and so that the length of the constituent fibers will run transverse the newly-formed web; moistening the web and forming crinkles in the web while moist, said crinkles running in a direction generally transverse the web and in the same general direction as the length of the constituent fibers.

3. The process of making a paper fabric for wrapping and packing purposes which consists in taking a web of suitable paper having the length of its constituent fibers run-

ning generally in the same direction and lengthwise the web and severing the web into separate sheets; attaching the sheets together to form a new web and so that the length of the constituent fibers will run transverse the newly-formed web; moistening the web; depositing the moistened web upon a smooth surface; crowding the paper back on itself at a sharp angle while on the smooth surface and thereby forming crinkles in the web running in a direction generally transverse the web and in the same general direction as the length of the constituent fibers.

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

BARTLETT ARKELL.

Witnesses:
EDWIN SEGER,
JOHN O. GEMPLER.