

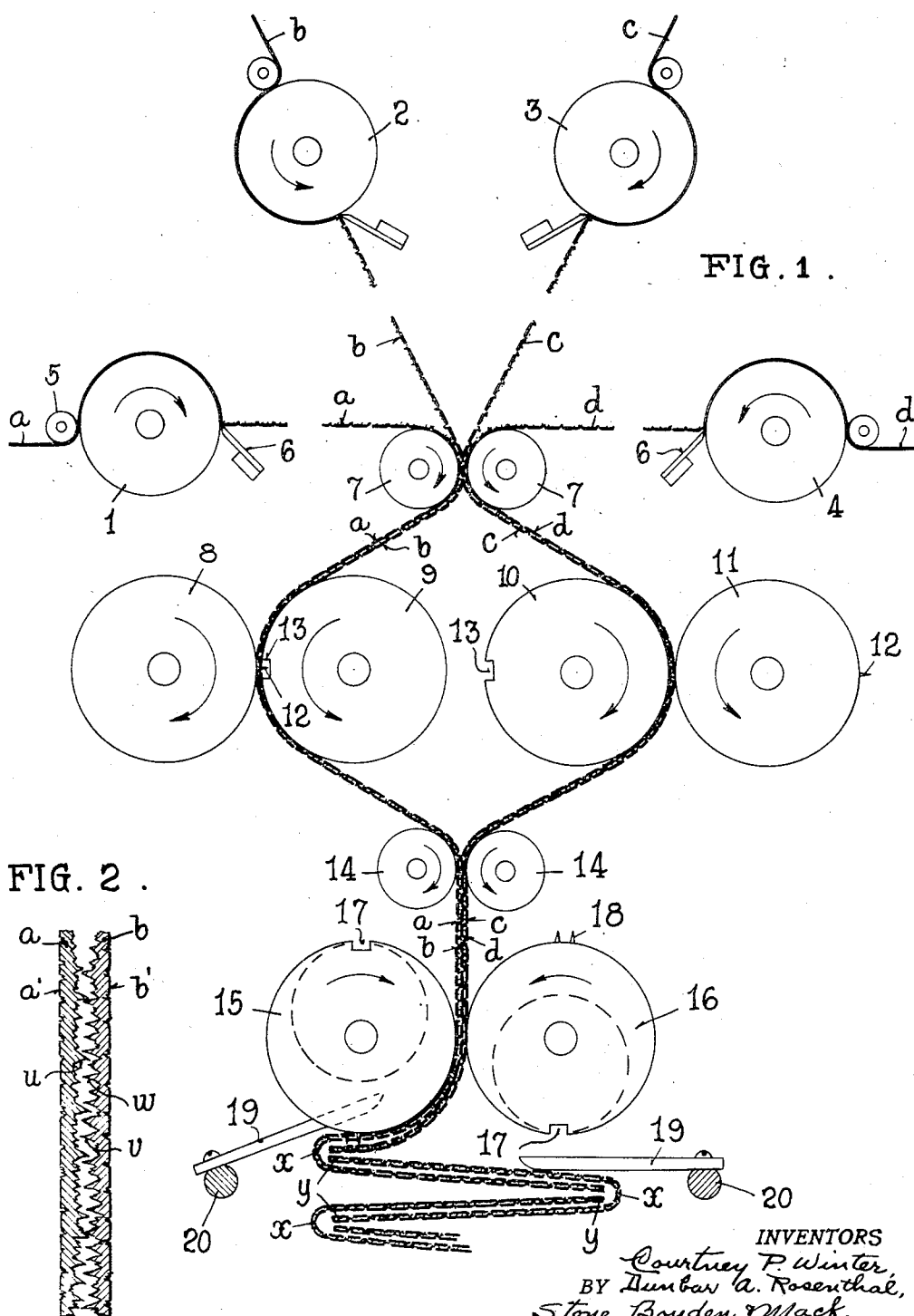
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PAPER TOWEL AND METHOD OF MAKING THE SAME

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PAPER TOWEL AND METHOD OF MAKING
THE SAME

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This invention relates to absorbent paper sheets or towels and more particularly to sheets of this character which are interfolded with each other and adapted to be dispensed one at a time from a suitable container.

The general object of the invention is to provide an improved article which shall have greater absorbent properties, which shall be more pleasant to the skin, which will not disintegrate so rapidly, and which can be withdrawn from the container more easily and certainly and with less danger of tearing.

In preparing our improved towels, we employ a creping process by means of which paper sheets of more or less crinkled character are produced. When a paper web in quite moist condition and adhering to the roll of a paper making machine is removed or scraped off by a doctor blade, that side of the sheet which was adjacent the roll comes off relatively smooth, except for a number of comparatively shallow almost imperceptible grooves, while on the opposite side of the sheet, the fibers are compacted into ridges of irregular height, rough in outline, and easily detected by touch. This rough side of the sheet is decidedly harsh and unpleasant to the skin, while the other side is relatively smooth to the touch.

Our improved towel comprises two such sheets arranged with their relatively rough surfaces innermost or in contact, and their relatively smooth surfaces outermost. The smooth surfaces are thus presented to the skin of the user and readily absorb the moisture. The moisture does not, however, readily pass from one sheet to the other, owing to the fact that the capillarity between the sheets is broken up by the ridges on the rough or inner surface thereof. Moreover, such a towel can be easily withdrawn from a package or container because the smooth surfaces of the sheets are in contact with the walls of the container and with each other, and this lessens the frictional resistance and permits withdrawal without danger of tearing, especially where the user's wet hand comes in contact with the towel.

In order that the invention may be readily understood, reference is had to the accompanying drawing, forming part of this specification, and in which:

Fig. 1 is a diagrammatic view illustrating the method of making the improved towels; and

Fig. 2 is a fragmentary transverse section on an enlarged scale, showing a fragment of the two assembled sheets forming a towel.

Referring to the drawing in detail, four separate webs *a*, *b*, *c* and *d* are preferably utilized in forming a package of the improved towels. These webs pass around and adhere to the surfaces of four rolls 1, 2, 3 and 4, the webs being pressed into contact with the surface of such rolls by means of guide rollers 5. The web during this

period is quite wet, as compared to usual practice.

Doctor blades 6 engage the rolls 1, 2, 3 and 4 at points remote from the guide rolls 5, and scrape or strip the damp webs therefrom and the desired creped condition is thereby produced. These webs *a*, *b*, *c* and *d*, after leaving the doctor blades may be treated in any suitable manner as by drying, heat, pressure, trimming, embossing or imprinting (not shown but indicated by a break in the web), eventually, but in dry condition, converging toward each other in the relative position as shown. For the purposes of this present invention and in contrast to usual practice in making crepe paper, the crepe effect is produced on a web which is quite moist, whereas it has been customary in usual creping processes to apply that treatment to a sheet from which water has largely been removed or which has been subjected to some sort of drying treatment. The optional desired treatments which may be given the webs after leaving the rolls 1, 2, 3 and 4 and their respective doctor blades and before reaching the rolls 7 might require that the webs be collected in individual rolls before being subjected to the succeeding steps of the present invention, but this is unimportant to the present invention and hence is not illustrated except diagrammatically by the breaks in the webs between the rolls 1, 2, 3 and 4 and the rolls 7.

The drawing shows the essential steps in the treatment of the webs. As indicated in Fig. 1, the surface of each of these webs which was in contact with the rolls 1, 2, 3 and 4 is relatively smooth while the opposite or outer surface is relatively rough and formed with irregular ridges. It will further be seen that as the pair of webs *a* and *b* pass between the rolls 7, the rough surfaces thereof are innermost or in engagement with each other while the smooth surfaces are outermost. The same is true of the pair of webs *c* and *d*.

After leaving the rolls 7, each pair of assembled webs pass between perforating rolls, the webs *a* and *b* passing between rolls 8 and 9 and the assembled webs *c* and *d* passing between rolls 10 and 11.

Two of these rolls, namely, the rolls 9 and 10, have a longitudinally extending groove 13 formed in their surface while the other two rolls, namely, the rolls 8 and 11, are provided with perforating blades 12 which are adapted to enter these grooves.

It should be noted that the blade and groove on rolls 8 and 9 are disposed 180° apart from the blade and groove on rolls 10 and 11 so that the lines of perforations in the two pairs of assembled webs do not register with each other but are spaced apart lengthwise of the webs a distance equal to half the circumference of the rolls. The lines of perforations on each assembled pair of

webs are of course spaced apart a distance equal to the circumference of said rolls.

After leaving the perforating rolls 8, 9, 10 and 11, the two pairs of webs are brought together and are led between another pair of rolls 14, which are driven at substantially the same peripheral speed as the rolls 7, 8, 9, 10 and 11.

Leaving the rolls 14, the two assembled pairs of webs pass through interfolding mechanism comprising a pair of rolls 15 and 16. These travel at a peripheral speed slightly faster than that of the preceding rolls, and thus exert a pull on that portion of the paper webs lying between them and the rolls 14. This pull results in the webs being torn apart at each line of perforation, a two-ply section being torn alternately first from the assembled pair of webs *a* and *b* and then from the assembled pair of webs *c* and *d*, as the two pair travel toward the rolls 15, 16.

The rolls 15 and 16 and interfolding mechanism, of which they form a part, may be of any well known construction, such, for example, as that illustrated in Patent No. 839,521, to J. H. Spoerl, dated December 25, 1906. Each of these rolls is provided with a longitudinal groove 17 and at a diametrically opposite point with one or more rows of pins 18. The rolls furthermore are cut away eccentrically as indicated in dotted lines, and as shown in said patent, to provide recesses in which stripper fingers 19 mounted on rock shafts 20 are adapted to oscillate, such oscillation being produced by any suitable means (not shown).

As a result of the arrangement above described, it will be seen that each pair of assembled webs is severed into sections or units having a length equal to the periphery of the perforating rolls 8, 9, 10 and 11, and that by reason of the staggered relation of the lines of perforations in the two pairs of assembled webs, these sections are torn by the rolls 15 and 16 first from one pair and then from the other alternately, and the units are interfolded and formed into a package by the stripper fingers 19. It will further be seen that each section or unit is folded transversely, as indicated at *x*, and that the free ends *y* of each of the two adjacent sections is enclosed within such fold. This method of interfolding, broadly speaking, is not new, being the same as that shown in the above mentioned patent to Spoerl. The present invention, however, differs from Spoerl in that two assembled pairs of sheets are interfolded instead of two single sheets.

In Fig. 2 of the drawing is illustrated on an enlarged scale a fragment of the two webs *a* and *b*, and it will be seen that the outer surfaces *a'* and *b'* of these assembled webs or sheets is relatively smooth. The inner faces of these webs or sheets, however, is relatively rough, having thereon numerous irregular projections or ridges *u* and *v*, respectively. When the rough sides of the sheets are placed face to face in engagement, as shown, these ridges do not, of course, fit together, but rather more or less abut and prevent close contact between the body of the sheets. Thus there are formed voids or air spaces *w* between the sheets and these serve to very materially break up or reduce the capillarity between the sheets. For this reason, the passage of moisture from one sheet to the other is substantially retarded and rapid disintegration of the towel

through weakening of the combined sheets due to excessive moisture is prevented. Also only the smooth surfaces of the sheets come in contact with the skin of the user, and the unpleasant harshness characteristic of many towels heretofore known is avoided. In addition to being more pleasant to use, the improved two-ply towel shown in Fig. 2 has superior absorbent qualities due to the fact that the outer surfaces, being relatively smooth, present larger effective areas which are capable of lying in flat contact with the skin or other wet surface.

Furthermore, owing to the fact that both pairs of webs are assembled with their smooth surfaces outermost, it will be seen by reference to Fig. 1 that it is the smooth surfaces of the towel sections or units which lie in contact with each other when assembled in a package. For this reason, the individual units readily slip apart when pulled, offering a relatively small frictional resistance, and may thus be easily withdrawn without tearing.

What we claim is:

1. A paper towel comprising a pair of co-extensive sheets each having one face smoother than the other, the smoother surfaces of both sheets being outermost.

2. A paper towel comprising a pair of sheets each having a relatively smooth and a relatively rough face, the rough faces of the two sheets engaging each other.

3. A paper towel comprising a pair of disconnected substantially co-extensive sheets each having one relatively rough face, said sheets being held in assembled relation solely by the adhesion of said rough faces.

4. A paper towel comprising a pair of disconnected substantially co-extensive sheets, and means formed on and constituting an integral part of the contacting surfaces of the sheets for breaking up the capillarity between said sheets, whereby moisture is not readily transmitted from one to the other.

5. The method of making two-ply paper towels which comprises laying a pair of separate webs continuously on two creping rolls, removing the webs from the rolls in such manner as to form each web with relatively rough and smooth surfaces, bringing the webs together with their relatively rough surfaces in engagement, and severing the assembled pair of webs into sections.

6. The method of making two-ply paper towels which comprises preparing two separate webs of indefinite length, each web with relatively rough and smooth surfaces on its opposite sides, pressing the webs together with their relatively rough surfaces in engagement, and severing the assembled pair of webs into sections.

7. The method of making paper towels which comprises causing a web of paper to adhere to a revolving roll, scraping the paper from such roll in such manner that one side becomes relatively smooth while the other side is relatively rough, bringing a second web, similarly prepared, into contact with the first mentioned web with the rough sides of the two webs adjacent, and severing the double web thus formed into sections of uniform length.

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