Dec. 26, 1933. C. A. FOURNESS 1,941,255

FELTED FABRIC

Filed March 11, 1932

Fig. 1

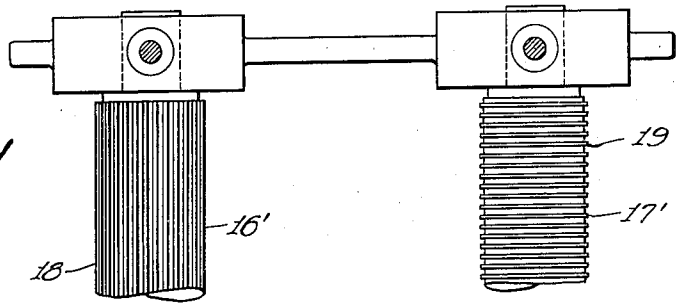


Fig. 2

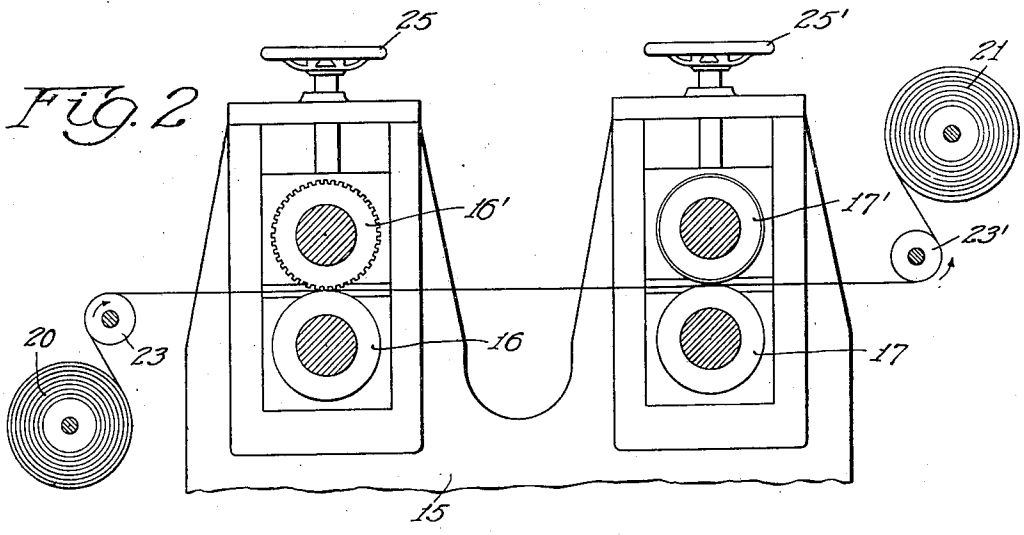


Fig. 3

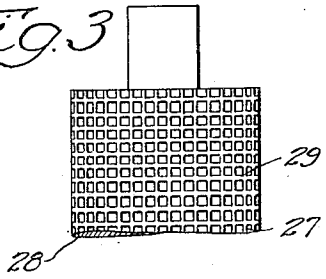
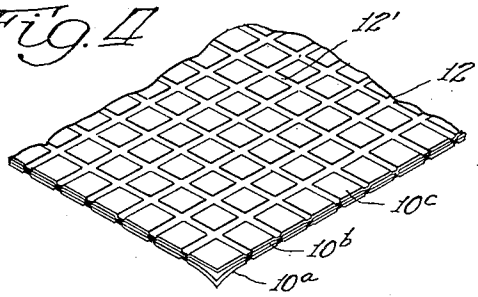


Fig. 4



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1,941,255

FELTED FABRIC

Charles A. Fourness, Neenah, Wis., assignor to International Cellucotton Products Company, Chicago, Ill., a corporation of Delaware

Application March 11, 1932. Serial No. 598,230

4 Claims. (Cl. 154—46)

My invention relates to felted cellulosic fabrics such as paper and the like, and particularly contemplates an article of the type referred to which is suitable for absorption of moisture, and is especially adapted for use as toweling, handkerchiefs, and the like.

A particular object of my invention is to provide an article of the type referred to which may be easily and inexpensively manufactured, and which is highly efficient for the purposes desired.

Various other objects and advantages will become apparent as the description proceeds.

Referring now to the drawing forming part of this specification and illustrating preferred embodiments of the invention:

Fig. 1 is a fragmentary plan view of one form of apparatus which may be used in fabricating the improved article.

Fig. 2 is a longitudinal sectional view of the same.

Fig. 3 is a fragmentary plan view of a roll used in a different embodiment of the apparatus, and

Fig. 4 is a perspective view of a portion of material made in accordance with my invention.

My invention contemplates the formation of a durable sheet of felted cellulosic material which may be formed by superimposing a plurality of relatively thin sheets of tissue paper or the like and then subjecting the composite sheet thus formed to an embossing or compression operation in which the fibers are compressed along spaced points or lines, said points or lines conforming to any desired configuration. Thus, in Figure 4 there is shown a sheet of material prepared in accordance with my invention, wherein the numerals 10*a*, 10*b*, and 10*c* represent sheets of tissue paper which have been superimposed on each other to form a composite sheet and then subjected to compressing rolls, whereby a plurality of criss-cross indentations 12 and 12′ have been applied to one surface thereof. While the checkerboard formation illustrated is a highly desirable embodiment of the invention, I do not consider my invention limited thereto but may use other designs, although, preferably, designs employing continuous spaced lines.

The article may be formed by means of apparatus as shown in Figures 1 and 2, comprising a frame 15 mounting compressing rolls. In the embodiment shown in Figures 1 and 2, two sets of rolls are used, including the pair 16, 16′ and the pair 17, 17′, these rolls being journaled in any approved manner in the frame 15. The rolls 16 and 17 are preferably smooth, while the roll 16′ is provided with a plurality of spaced longitudinal ridges 18, and the roll 17′ is provided with a plurality of spaced circumferential ridges 19, the respective ridges of each roll being preferably parallel and equi-spaced. The multi-ply material may be fed in a web from a feed roll 20, through the two pairs of embossing rolls to a take-up roll 21, the web being maintained substantially taut by means of the auxiliary rolls 23 and 23′.

I prefer to provide the embossing rolls with adjusting screws 25, 25′, so as to control the amount of pressure exerted by the rolls on the web. The amount of pressure necessary will vary according to the nature of the fibers used, their moisture content, the number of plies in the fabric, and other factors, and may be readily determined by those skilled in the art. I prefer to apply sufficient pressure to compress the fibers along the lines 12, 12′ sufficiently to produce what is known in the paper art as "hydration"; that is to say, the fibers at these points will be so compressed that the fabric will lose its usual opaqueness and will become substantially translucent along these lines, appearing black in reflected light. However, this is not an indispensable condition, although it is preferred.

While I do not limit myself to any particular spacing of the lines 12, 12′, they are preferably arranged sufficiently close together so that a very large percentage of the fibers are actually secured in the embossed areas represented by these lines. In this way, when the fabric is being used for moderate service, as in drying the hands, etc., the fibers will be effectively retained and prevented from being rubbed out of the fabric.

In an alternative form of apparatus which may be used satisfactorily in producing the improved article, Figure 3 shows a press which utilizes only a single pair of rolls, one press being a smooth roll similar to rolls 16 and 17 and its co-operating roll 27 containing both longitudinal ribs 28 and circumferential ribs 29. The article formed by this apparatus is substantially similar to that produced by the embodiment of Figures 1 and 2.

The multi-ply toweling made in accordance with my invention may be formed of any convenient number of sheets, but I preferably use at least two and not more than twenty plies, which may be of either creped or uncreped tissue paper. I preferably use about three plies.

The article described above has many advantages. Thus, it may be produced very cheaply, it is very soft, and is highly moisture-absorbent. A

further very important feature is that the material does not readily disintegrate in use, as in drying one's hands thereon, leaving numerous fibers clinging to the skin, but remains in a substantially integral condition when used.

I realize that composite fabrics have been suggested for packing and like purposes wherein a plurality of plies of felted material are secured together by embossed designs of various sorts. Furthermore, multi-ply fabrics have been suggested for toweling, etc., wherein the plies have been secured together by adhesive material. According to my invention, however, I may avoid the expense of adhesive material and the expense involved in the maintenance of equipment necessary for supplying the same, and obtain adhesion of the layers solely by means of compression. My preferred fabric, furthermore, is especially efficient by reason of the fact that the pressure lines extend substantially continuously across the entire width of the fabric and are spaced relatively close together so as to prevent fiber removal in use, as described above. If desired, adhesive material may also be used at the compressed areas.

Various modifications coming within the spirit of my invention will doubtless suggest themselves to those skilled in the art. Hence, I do not wish to be limited to the specific embodiment described above or uses mentioned except to the extent indicated by the appended claims, which are to be interpreted as broadly as the state of the art will permit.

I claim as my invention:

1. An article of the class described, comprising a plurality of superposed plies of felted cellulosic material secured together by means of a plurality of pressure areas extending substantially continuously thereacross, said areas having been sufficiently compressed, in the absence of adhesive material, to produce hydration of the fibers and spaced sufficiently close together to prevent substantial fiber removal from between said areas when said article is subjected to moderate rubbing use, as in drying the hands, and said areas being small as compared to the uncompressed areas.

2. An article as defined in claim 1, wherein said pressure areas extend in criss-cross formation.

3. An article as defined in claim 1, wherein said pressure areas extend in rectangular or waffle-like formation.

4. An article of the class described, comprising a plurality of plies of felted cellulosic material secured together by means of a plurality of areas which are sufficiently compressed, in the absence of adhesive material, to produce hydration of the fibers, said pressure areas being spaced sufficiently close together to prevent substantial fiber removal from between said areas when said article is subjected to moderate rubbing use, as in drying the hands, and said areas being small as compared to the uncompressed areas.

CHARLES A. FOURNESS.