March 4, 1930. G. A. RICHTER 1,748,998

COMPOSITE SHEETING AND METHOD OF MAKING

Filed Oct. 6, 1928

Fig. 1.

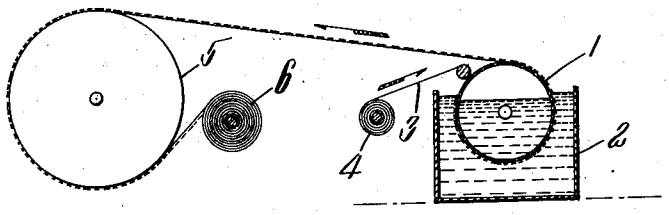





Fig. 3.

Fig. 5.

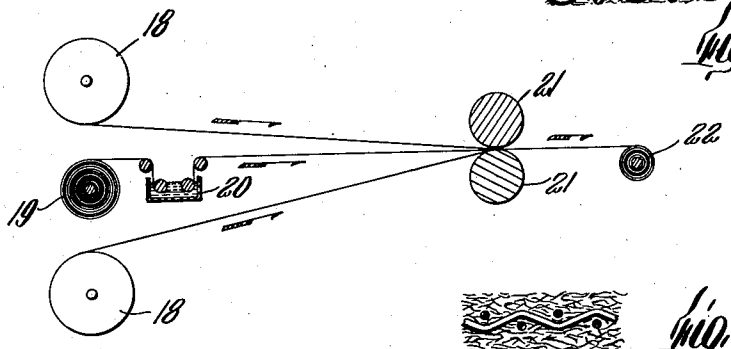
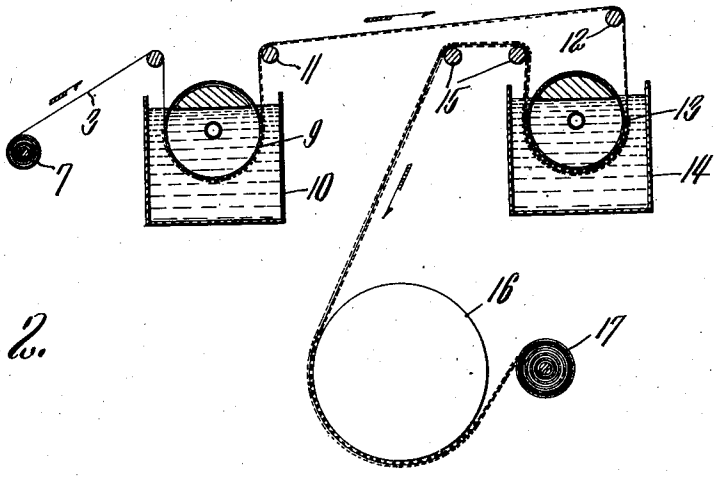





Fig. 4.

Fig. 2.




Inventor
George A. Richter
by Wright Brown Quinby & Batchelder
Attys

Patented Mar. 4, 1930 1,748,998

# UNITED STATES PATENT OFFICE

GEORGE A. RICHTER, OF BERLIN, NEW HAMPSHIRE, ASSIGNOR TO BROWN COMPANY, OF BERLIN, NEW HAMPSHIRE, A CORPORATION OF MAINE

## COMPOSITE SHEETING AND METHOD OF MAKING

Application filed October 6, 1928. Serial No. 310,710.

This invention has to do with the manufacture of composite sheet material made with cellulose fiber such as wood pulp as a raw material, and intended for various uses, being especially serviceable as a base or foundation for the production of coated or impregnated products.

When cellulose fiber such as wood pulp is used as a raw material for the manufacture of felted fibrous foundations, it has sometimes been desirable to felt the fibers into a more or less fluffy web on machinery of the paper-making type, so that the web may be capable of quickly absorbing a large amount of liquid impregnating materials, such as rubber latex, for instance. A sheet of especially high absorptivity is produced when refined wood pulp of high alpha cellulose content in substantially unbeaten condition is used, and the web formed without being subjected to high pressure during felting or drying, as in such case the resulting sheet is highly absorbent, not only because of the loosely felted condition in which the fibers exist but also because of the absorbency of the fiber itself. One of the serious disadvantages of a web so made, however, is that it is comparatively weak and is hence likely to be broken when subjected to the stresses of usual treating operations, as for instance, when drawn in continuous form through a bath of liquid impregnating agents. In accordance with the present invention, this difficulty is overcome by reinforcing the fluffy web with a flexible metallic backing, which may take the form of strands of wire arranged in generally parallel relationship with or without lateral tying or filling strands, wire cloth or screening, or highly flexible, thin sheet metal with or without perforations therein. When wire screening is used as the backing material, reinforcement of the web may be effected by felting the pulp fibers to one side of the screening while it is being supported as on a cylinder mould, and then, if desired, felting the pulp fibers to the other side of the screening. Or one or more fluffy webs may be adhesively secured face to face to the flexible metallic backing. A composite web thus produced comprises a fluffy web of pulp reinforced either exteriorly or interiorly by the flexible metallic backing. If the pulp fibers have been deposited on wire screening, they are felted to and entangled in the screening, although some entanglement is effected even when a fluffy web is adhesively secured to wire screening. A fluffy web reinforced as described may be used as a raw material in various processes, being sufficiently strong to be handled in continuous sheet form without likelihood of breaking. For instance, it may be successfully drawn through baths of liquid materials, the web absorbing a large amount of such material, owing to its high absorptivity. While not limited thereto, a composite web of this kind is especially suitable for use as a raw material in the manufacture of artificial leather suitable for use where the characteristics of flexibility, high strength, and low stretch are desired, as, for instance, in the manufacture of belting. By passing the composite web through a rubber-containing bath, e. g., a rubber-benzene solution, rubber latex, or an artificial aqueous dispersion of rubber, and then removing the liquid rubber vehicle, an artificial leather of this type may be produced. The surface of the fluffy web may be embossed quite satisfactorily, owing to the permanent displacement or "give" in the material when subjected to embossing action before the liquid rubber vehicle is removed. The composite web also lends itself well to coating or impregnation with thermo-plastic materials such as asphalt, or waxes such as Montan and carnauba, with varnishes or lacquers of the nitro-cellulose type, and with other materials. With these and other features in view, the invention may be best understood from the following more detailed description thereof when considered in conjunction with the accompanying drawings, wherein

Figure 1 illustrates more or less diagrammatically and conventionally a method of externally reinforcing the web with wire screening.

Figure 2 illustrates a method of forming a web internally reinforced with wire screening.

Figures 3 and 4 represent enlarged sections through composite webs formed by the methods shown in Figures 1 and 2, respectively.

Figure 5 illustrates a method of reinforcing pre-formed webs with any suitable flexible metallic backing.

Referring in detail first to Figure 1 of the drawings, 1 indicates a cylinder mould which rotates in a pulp suspension maintained in a vat 2. Wire screening 3 of, say, about 40 mesh, made of high grade steel or other suitable metal, may be progressively unwound from a roll 4 and passed into contact with and then around the submerged portion of the mould on which it is supported. The pulp suspension fed into the vat 2 is preferably of very dilute consistency, containing say about 0.005% to 0.01% fiber, preferably in an unbeaten condition, especially when a highly absorbent web is desired. As the wire screening passes into the pulp suspension, pulp fibers are deposited thereon while water is passing into the cylinder mould and being removed, so that when the wire moves out of the suspension it carries a wet pulp layer the fibers of which are entangled therein, as illustrated in Figure 2. The wet pulp layer is preferably dewatered without being subjected to heavy pressure, this being shown as accomplished by passing the screening with the wet web carried thereon around a drum drier 5, from which the dry composite web is removed and wound into a roll 6.

If an interiorly reinforced web is desired, the method illustrated in Figure 2 may be practised. According to this method, a roll 7 of suitable wire screening 3 may be progressively unwound and passed around the submerged portion of a cylinder mould 9 rotating in a vat 10 being supplied with pulp suspension. This screening leaves the vat 10 with a wet pulp layer on its under side, and is guided successively over rolls 11 and 12, thence around the submerged portion of a second cylinder mould 13, with the pulp layer in contact with the periphery of the mould, which rotates in a vat 14 supplied with pulp suspension. As the screening with its inner pulp layer proceeds through the pulp suspension, pulp fibers are deposited on the outer side of the screening, so that the screening passes out of the pulp vat 14 with wet pulp layers on both sides. The screening and pulp may then be guided over rolls 15 and over a drum drier 16, from which the dry composite web is removed and wound into a roll 17.

If desired, the wire screening or other suitable flexible metallic backing may be adhesively united with one or more fluffy webs of the character described, which have been formed without reinforcement. Figure 5 illustrates such a method, according to which two rolled fluffy webs 18 and rolled backing 19 are simultaneously unwound, the backing being guided through a bath 20 of suitable adhesive such as rubber latex, whereupon the fluffy webs may be united with the opposite faces of the backing as by passing the three in superposed relation into the nip of a pair of press rolls 21, the resulting composite sheet being wound into a roll 22.

Cellulose fibers of various origins may be employed in producing the fluffy web hereinbefore described, but it is preferable to employ a refined wood fiber of high alpha cellulose content in substantially unbeaten condition. It is further preferable to felt the fibers loosely, this being accomplished by forming the web and drying it without subjecting it to heavy pressures. The resulting web, when thus formed, is of especially high absorptivity, owing to the loosely felted condition of the fibers and also to the high absorptivity of the fiber itself.

The composite sheet may be successfully subjected to various treating operations in continuous sheet form, it being especially useful as a foundation for the manufacture of artificial leather, as the fluffy web material may be able to absorb in the order of magnitude of 100% to 200% rubber, based on the dry weight of fiber. An artificial leather thus produced serves well in the manufacture of power belts, owing to its high strength and low stretch characteristics.

Having thus described an embodiment of this invention, it should be evident to those skilled in the art that it is capable of various changes and modifications without departing from the spirit or scope of invention as defined by the appended claims.

I claim:

1. Rubber-impregnated composite sheet material comprising substantially unbeaten cellulose fibers in a loosely felted condition, united with flexible metallic screening.

2. Rubber-impregnated composite sheet material comprising flexible metallic screening faced on opposite sides with substantially unbeaten pulp fibers in loosely felted condition.

3. A method of making a reinforced pulp web, which comprises progressively passing wire screening about a cylinder mould rotating in a pulp suspension to deposit a layer of pulp on one side of the screening, progressively passing it about a second cylinder mould rotating in a pulp suspension with the layer of pulp thereon contacting with the mould to deposit a layer of pulp on the other side of the screening, and drying the resulting composite web.

In testimony whereof I have affixed my signature.

GEORGE A. RICHTER.