Oct. 15, 1929. T. G. RICHARDS 1,731,754

ARTIFICIAL LEATHER SHEETING AND METHOD OF MAKING THE SAME

Filed May 11, 1928

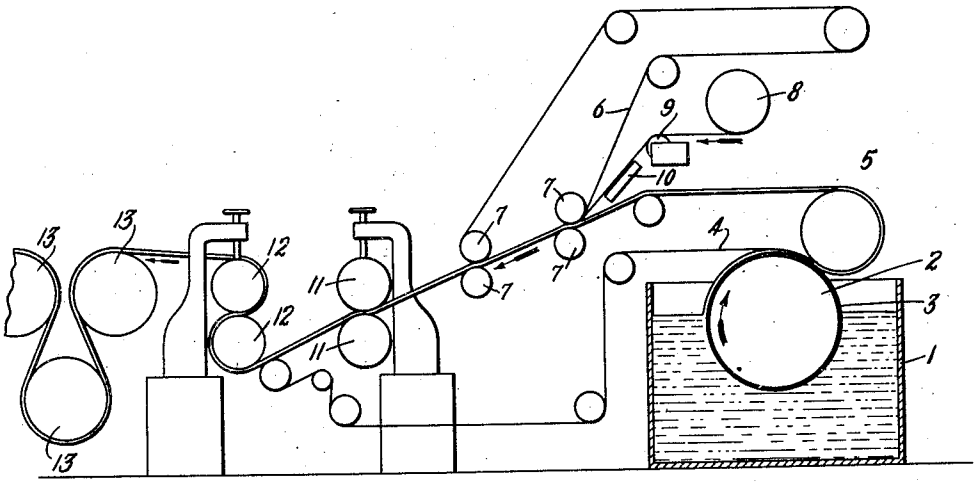


Fig. 1

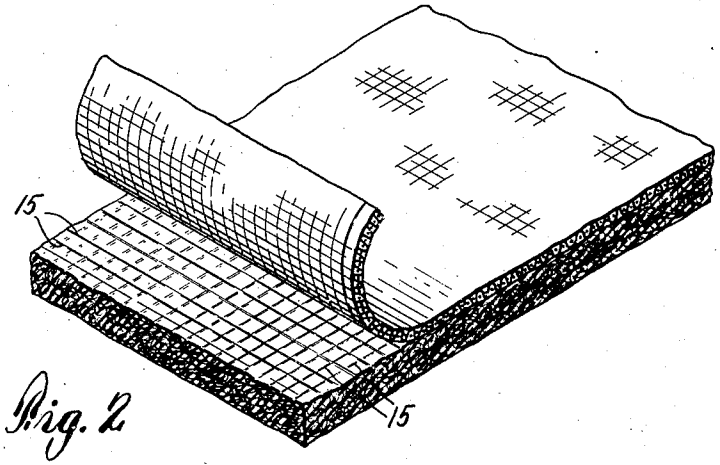
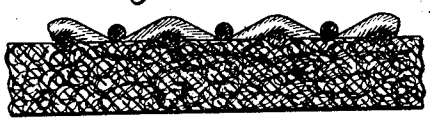


Fig. 2

Fig. 3



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UNITED STATES PATENT OFFICE

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ARTIFICIAL LEATHER SHEETING AND METHOD OF MAKING THE SAME

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It has been proposed to manufacture artificial leather sheetings by incorporating aqueous dispersions of rubber,—for example, rubber latex and artificial aqueous rubber dispersions,—into fibrous pulp in a beater engine, coagulating the rubber on the fibers, then sheeting and drying the resulting stock on papermaking machinery. It has been found possible to produce artificial leather sheeting of great strength, tear resistance, and pliability by this method, especially when fibers of high fiber length and a high percentage of rubber are used. The sheeting may be calendered and vulcanized, so as to compact and strengthen the same, and may be finished by coating the surface with a lacquer of the nitrocellulose type, and embossing the lacquered surface so as to simulate the grain of natural leather.

The object of the present invention is to produce sheetings of the character described, which will have excellent physical characteristics, including strength, tear resistance, and pliability, even when comparatively short-fibered pulps and a comparatively low percentage of rubber are used as raw materials. This object is attained, in accordance with the present invention, by progressively superimposing on and pressing into the sheeting, while it is wet on the papermaking machine, a reinforcing fabric such as cheesecloth, so that when the sheeting is subsequently dried and vulcanized, the reinforcing fabric will be firmly bonded and vulcanized thereto. The bonding may be enhanced by treating the fabric, before pressing it into the wet sheeting, with rubber in the form of a rubber-benzine solution or an aqueous rubber dispersion, and preferably removing the rubber-carrying vehicle from the fabric so as to effect a good initial bond and avoid gumming of the machine.

The present invention makes possible the reinforcement of rubber-fiber sheeting in a practical and inexpensive way, as a continuous sheet of fabric may be progressively superimposed on and pressed into the sheeting while it is passing into the nip of any one of the pairs of squeeze rolls at the wet end of a paper machine. The reinforced sheeting may then be dried and vulcanized to effect a tenacious bonding of the fabric thereto.

In practising the process of the present invention, a suitable stock is prepared in the beater engine. A beater furnish established as satisfactory for the manufacture of an artificial leather to be used, for example, for furniture and automobile upholstering is prepared substantially as follows. About 500 pounds of rags, previously conditioned, if desired, as is known to those skilled in the art, is charged into a beater engine, together with sufficient water to ensure circulation. The rags may then be beaten or hydrated to the desired slowness, whereupon a comparatively small amount of an alkaline reagent, such as ammonia and/or caustic soda, may be added to render the stock alkaline and thus to make sure that the stock will not coagulate the aqueous rubber dispersion to be added. For this purpose, about 5 quarts of 26° aqua ammonia and about 4 quarts of sodium silicate, 60° Baumé, is quite suitable, the sodium silicate being subsequently coagulated along with the rubber. To the alkaline pulp is then added 480 pounds of an aqueous rubber dispersion having a solids content of about 33%, which solids comprise the following ingredients:

90% dispersed rubber (tube reclaimed); sodium caseinate—casein, 9%, caustic soda, 1%.

It is preferable to add a comparatively small amount of glycerine, say, 4 quarts, along with the aqueous rubber dispersion, as it apparently appreciably improves the characteristics of the resulting sheeting, and also to add a certain amount of sulphur, say 2.2 pounds, so that the resulting sheet may be vulcanized. If desired, a certain amount of sizing material, say, 30 pounds of rosin size, may also be added, as the sizing material also improves the characteristics of the sheeting. After the raw materials composing the furnish have been homogeneously mixed by the operation of the beater engine, a suitable coagulant is added, in amount sufficient to ensure coagulation of all coagulable materials on the pulp fibers, about 90 pounds of alum

being sufficient for this purpose. The foregoing is merely representative of a large variety of furnishes which may be employed in forming the sheeting of the present invention, the particular furnish employed, however, per se not constituting any part of the present invention.

With these and other objects in view, the invention may best be understood from the following more complete description thereof when considered in conjunction with the accompanying drawings, wherein

Figure 1 represents diagrammatically and conventionally the wet end of a paper machine of the cylinder type, illustrating a method of reinforcing the sheeting according to the present invention.

Figure 2 represents in perspective an enlarged fragment of the reinforced sheeting, with the reinforcing fabric partially lifted therefrom.

Figure 3 is an enlarged section through the sheeting, showing how the reinforcing fabric is pressed thereinto.

Referring in detail to Figure 1 of the drawings, 1 indicates a vat of a cylinder machine, into which a stock comprising fiber and a rubber coagulum prepared in the beater engine, as hereinbefore described, may be delivered at a consistency suitable for sheeting. 2 indicates a cylinder mould rotating partially submerged in the stock, in the direction indicated by the arrow, being covered with wire mesh 3, so that the water content of the stock passes into the mould, from which it is removed while the stock deposits in the form of a sheeting on the surface of the mesh. The sheeting is carried by the cylinder mould until it contacts with a travelling felt 4 pressed against the unsubmerged portion of the cylinder mould by a couch roll 5, the felt picking the wet sheeting off the mesh of the cylinder mould and carrying it around the couch roll, the wet sheeting being supported on the felt as it continues on its travel through the machine. The wet sheeting is shown passing under another felt 6, being pressed between the two felts by successive pairs of rolls 7, 7, which serve to dewater and compact it sufficiently to enable it to withstand higher pressures without disintegrating. Inasmuch as the sheeting is quite wet and pulpous before being subjected to the action of the rolls 7, it is desirable to unite the reinforcing fabric with the web while it is in this condition, as the fabric may be readily pressed thereinto, so that upon subsequent drying of the sheeting, the fabric will be tenaciously bonded to the fiber and rubber. Figure 1 shows the reinforcing fabric being unwound from a roll 8 and its under side contacting with a roll 9 rotating in a bath of rubber-benzine solution, rubber latex, or artificial aqueous rubber dispersion. The fabric is shown as then passing over a heating unit 10, which removes the rubber solvent or aqueous medium from the fabric, and then passing superposed on the wet sheeting between the felts 6 and 4, just as they pass into the nip of the first pair of rolls 7. The fabric is thus pressed into the wet sheeting, the reinforced wet sheeting then passing between the second pair of rolls 7. The sheeting passes from between the upper and lower felts and is then carried between a pair of rolls 11, which may exert greater pressure on the sheeting. The sheeting is now shown leaving the felt 4 and passing between another pair of rolls 12, the felt returning to the cylinder mould over suitable guide rolls. The sheeting passes from the rolls 12 to a nest of dryer drums 13, the removal of moisture therefrom resulting in a firm bonding together of the fabric with the rubber and fiber. After drying, the sheeting may be subjected to heavy pressure, e. g., a calendering operation, this being effected at an elevated temperature, if desired, to ensure vulcanization of the rubber. As shown in Figure 3, the fabric is pressed into or partially embedded in the fiber and rubber, so as to avoid any danger of separation of the fabric therefrom, and so that the product is reinforced longitudinally and laterally. The partial embedding of the fabric is further illustrated in Figure 2, impressions 15 being left in the rubber and fiber when the fabric is forcibly separated therefrom.

While the sheeting of the present invention has been described as being produced on a single cylinder machine, it is evident that it may be made on a multi-cylinder machine, the fabric reinforcement being pressed into one or more of the wet webs or between them, while passing through a pair of rolls at the wet end of the machine. It is preferable to press the fabric into the sheeting while it is still in a nascent or pulpous condition, although of course this may be done even after the sheeting has been more or less dewatered.

Having thus described certain embodiments of this invention, it is evident to those skilled in the art that various changes or modifications might be made therein without departing from the spirit or scope of invention as defined by the appended claims.

What I claim is:

1. A method which comprises sheeting an aqueous stock comprising fiber and rubber coagulated thereon, progressively superimposing on and pressing into the sheeting while wet a reinforcing fabric, and drying the reinforced sheeting.

2. A method which comprises sheeting an aqueous stock comprising fibrous material and a rubber coagulum in paper formation, progressively superimposing on and pressing into the sheeting while wet a reinforcing fabric, and drying and vulcanizing the reinforced sheeting.

3. A method which comprises sheeting an

aqueous stock comprising fibrous material and a rubber coagulum in paper formation, progressively superimposing on and pressing into the sheeting while wet a rubberized reinforcing fabric, and drying the reinforced sheeting.

In testimony whereof I have affixed my signature.

THOMAS G. RICHARDS.