April 13, 1937. J. J. JACKSON 2,076,993

DECORATIVE SHEET AND PROCESS OF PREPARING THE SAME

Filed Feb. 10, 1934 2 Sheets-Sheet 1

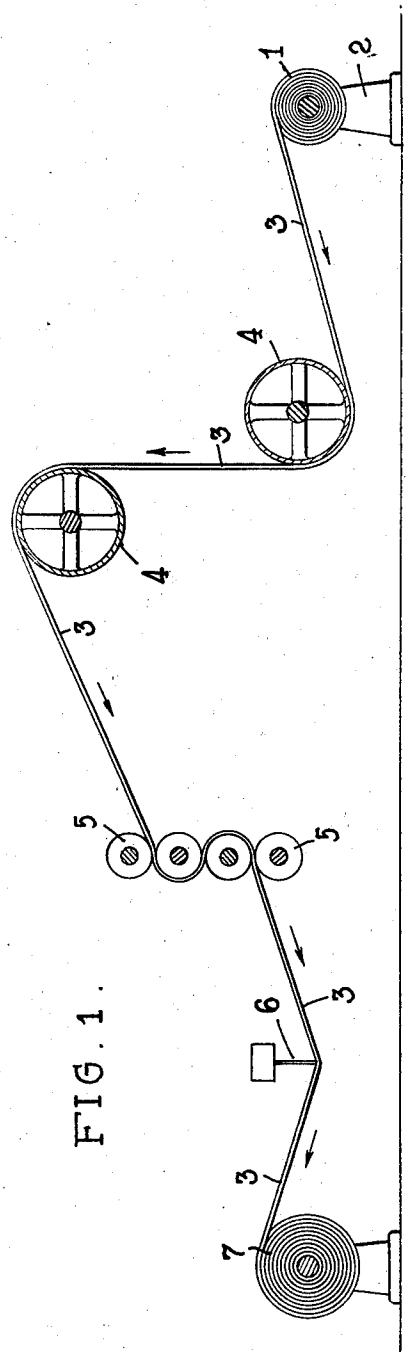


FIG. 1.

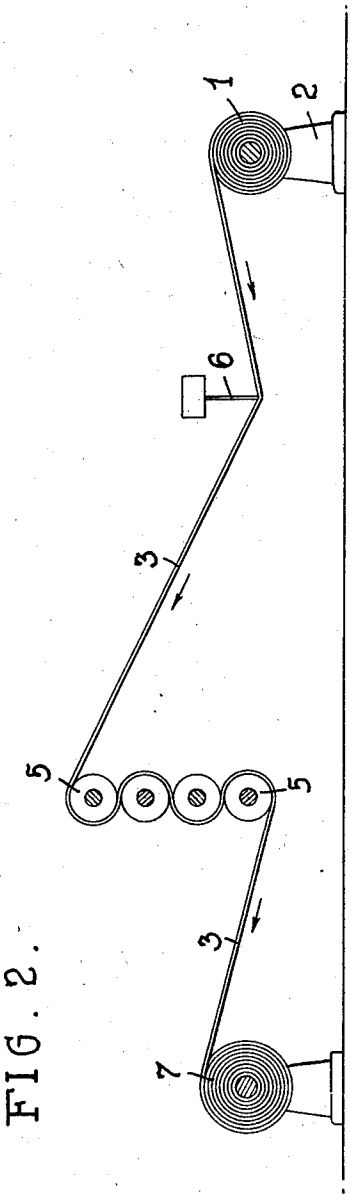


FIG. 2.

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FIG. 3.

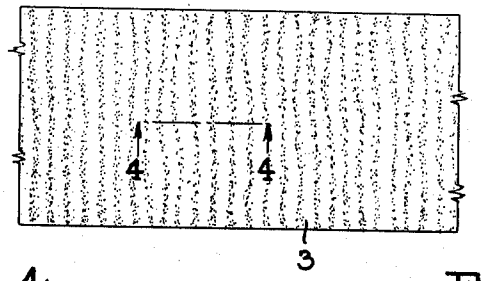


FIG. 4.

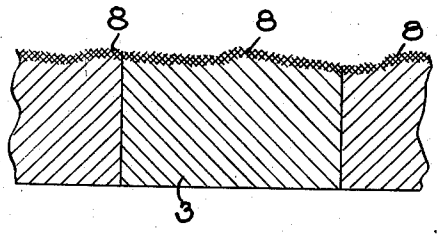


FIG. 5.

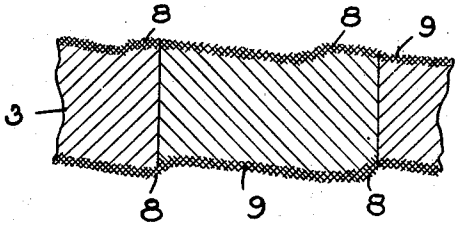


FIG. 6.

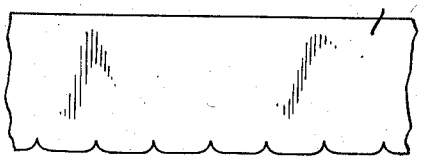


FIG. 7.

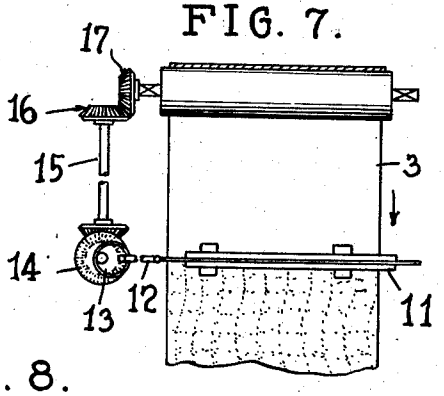
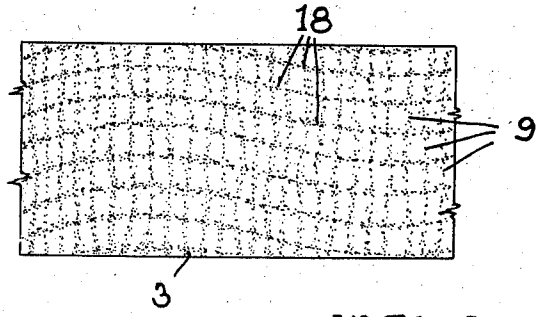


FIG. 8.



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Patented Apr. 13, 1937 2,076,993

UNITED STATES PATENT OFFICE

2,076,993

DECORATIVE SHEET AND PROCESS OF PREPARING THE SAME

James J. Jackson, Woodbury, N. J., assignor to Paulsboro Manufacturing Company, Paulsboro, N. J., a corporation of New Jersey

Application February 10, 1934, Serial No. 710,739

12 Claims. (Cl. 91—68)

This invention relates to fibrous sheets which are commonly used to cover floors, walls and similar uses where it is desired to provide a decorative surface.

More particularly the invention relates to sheets, particularly paper and felt, which are treated to improve their appearance and to the process by which the sheets may be prepared. Among the factors improved are the appearance of softness, simulation of pile fabrics and the depth characteristic of that type of goods.

Although the process herein disclosed may be applied to many analogous felted materials to produce the same result, the process is particularly adapted to the treatment of fibrous sheets such as are disclosed in Patent 1,998,779 of Ralph G. Jackson. In that patent is disclosed a fibrous sheet composed of artificially swelled and curled, non-woven vegetable fibres, which are felted together to form a relatively porous sheet.

Likewise, the process herein disclosed may be used to treat the surface of felted materials in which no other prior or subsequent surface treatment is contemplated, but in its preferred form this invention contemplates the treatment of the surface of a felted material, such as a porous paper or paper felt, to give it a rippled effect, and also treating it in addition to enhance its general appearance. Additional steps in the process are clearly set forth in detail in Patent 1,998,780 of Ralph G. Jackson, which teaches a process of decorating felted sheets comprising applying a coloring material to the felted sheet, in such a manner that it permeates substantially throughout the thickness thereof, then applying a toughening saturant to increase the resistance of the sheet to wear and finally roughening the surface to restore the natural nap which has been impaired by the application of the toughening saturant.

The invention is generally directed toward providing a paper or felt sheet which will give a pleasant and novel decorative effect. In many cases where sheets of this type are used, it is desirable to produce an outward appearance similar to that of a woven pile fabric, as contrasted to the relatively smooth glossy finish of ordinary floor coverings which are made from sheets carrying a coating of painted decorations. In Patent 1,998,780 above referred to, this general object is appreciated and it contemplates the provision of a nap surface to produce this desirable result. The present invention contemplates obtaining a soft appearing finish by providing a series of irregular ridges on one surface of the sheet to give a rippled effect. This rippled effect materially softens the general appearance of the sheet.

In general it is an object of the invention to provide a fibrous sheet which has one surface formed of a plurality of irregular ridges.

Another object of the invention consists in the provision of a fibrous sheet having a nap surface, said nap surface being roughened to form a plurality of irregular ridges to give a rippled effect.

Still another object of my invention consists in providing a sheet having decorations extending substantially throughout the thickness thereof which has one side roughened to form a rippled surface.

Yet another object of the invention consists in providing a fibrous sheet having a rippled surface, said sheet having decorations extending substantially throughout its thickness and which has been impregnated with a toughening saturant to increase its resistance to wear.

Another object of the invention consists in providing means for producing wavy lines transversely of the ripples on the sheet surface.

Still other and further features of the invention pertain to the process by which the improved sheets may be prepared.

Many other advantages and objects of the invention will become apparent from the following specification when considered in connection with the accompanying drawings.

In the drawings:

Fig. 1 represents diagrammatically one manner in which a fibrous sheet may be treated to produce a rippled effect on one surface thereof;

Fig. 2 represents diagrammatically a modified form of the sheet treating apparatus for producing ripples;

Fig. 3 shows a plan view of a portion of the improved sheet;

Fig. 4 is a greatly enlarged sectional view taken on the line 4—4 of Fig. 3 showing the rippled nap surfaces;

Fig. 5 is an enlarged sectional view similar to Fig. 4 showing a sheet having both surfaces treated;

Fig. 6 is a modified form of doctor blade which may be used to create a more irregular rippled surface;

Fig. 7 shows diagrammatically a mounting for the doctor blade shown in Fig. 6 which permits reciprocation of the doctor blade as the sheet passes under it; and

Fig. 8 is a plan view of the treated surface of

the sheet created by the notched reciprocating doctor blade of the apparatus shown in Fig. 7.

With reference to the drawings, a roll 1 of untreated felt is mounted upon a support 2 in such a manner that it may be unreeled at will. The portion of the felt sheet 3 being treated passes, as indicated by the arrows, over a pair of drying rolls 4 and then passes between one or more pairs of a stack of driving or tensioning rolls 5. From there the felted sheet passes under the edge of a doctor blade 6 of a length preferably sufficient to extend across the entire width of the sheet 3. The sheet 3 is then wound into a roll. The roll 7 may be wound by any means conventional in the art, which serves to maintain a proper tension on the material passing under the edge of the doctor. The doctor blade is made of slightly flexible steel of considerable width and supported by that edge opposite from the edge of the blade which engages the surface of the sheet. The doctor blade has a length of perhaps seven feet, sufficient to extend across the entire width of the sheet. Its width may be seven or eight inches and its thickness approximately one-sixteenth of an inch so that it will be flexible. Thus it will be seen that as the fibrous sheet 3 moves under the edge of the doctor blade 6, the material of the sheet tends to back up against the side of the blade adjacent the edge, then slips beneath the edge, and another portion of sheet passes beneath the blade until another ridge of sheet material is scraped up or pulled up against the blade. Thus the edge of the blade is caused to vibrate back and forth roughening the surface of the fibrous sheet 3 to form a series of irregular ridges, creating a rippled effect on the surface of the sheet.

It will be noted from the drawings, particularly Figures 4 and 5, that the ripples on one side rise gradually to their crests and then dip off sharply. "Ripple" is thus not to be confused with a substantially plain surface having narrow regular grooves such as might be suggestive of embossed tile effects but rather the ripple effect designates wide valleys with hills having inclined sides, one of which is sharply inclined.

It is often highly desirable to create a sheet of this type which is reversible, that is, which has both surfaces treated so that either one may be exposed as desired. In order that this may be accomplished, the roll of felt after being passed through the apparatus shown in Figs. 1 or 2 is again passed through beneath the doctor blade 6 in a manner which will cause the doctor blade to ripple the opposite surface of the sheet. In this case, it is desirable to apply the decorations from both surfaces of the sheet, the decorations in each case extending a portion of the way through the sheet. An enlarged sectional view of a portion of the completed product manufactured in this manner is shown in Figure 5.

In order to make ripples of a more irregular nature than will normally be reproduced by the doctor blade 6 as described in connection with Figures 1 and 2, it has been found that if a doctor blade containing a series of notches or teeth along its edge is used, that ripples will be formed longitudinally of the sheet by the notches in the blade, as well as transversely of the sheet, as described above.

An attractive irregularity of the decorative rippled effect may be obtained if the doctor blade is reciprocated transversely of the sheet as the sheet passes under its edge. Diagrammatically shown in Figure 7 are means illustrative of the manner in which the doctor blade may be reciprocated. The notched doctor blade 10 is mounted in a backing member 11 which permits a limited transverse movement of the blade. One end of the blade is connected by means of a link 12 to a cam 13, secured to a gear 14. The gear 14 may be driven by any suitable means, preferably from the same source of power which serves to drive the web 3 underneath the edge of the doctor blade.

As is shown in Figure 7, the gear 14 may be driven by a shaft 15 which is geared by means of the bevelled pinions 16 and 17 to one of the rolls of the calender stack which serves to move the material. It will therefore be seen that in this type of apparatus, the movement of the doctor blade transversely with the sheet will bear a definite ratio to the movement of the sheet beneath the edge of the doctor blade.

After the sheet has been treated by the doctor blade 6, it may have coloring material applied substantially throughout its thickness, then impregnated with a toughening saturant, after which the rippled surface is roughened to restore the nap thereto. These additional subsequent steps are set forth in detail in the prior copending application above referred to. The finished sheet is shown in highly magnified section in Fig. 4 in which the different colors extending substantially through the sheet are indicated by the different cross hatching. The ridges 8 are seen formed on the nap surface 9.

By way of example, one specific embodiment of applicant's improved sheet may be produced in the following manner. A felted sheet of artificially kinked and curled vegetable fibres, having a natural nap on both sides, is passed under the doctor blade and one nap surface rippled as has just been described. The sheet is then printed with an ink, dye or paint which colors the fibres substantially throughout the thickness of the sheet in accordance with the teachings of the Patent 1,998,780, above referred to. The sheet is then impregnated with a toughening saturant. Such a saturant may be made of about 85% by weight of pale ester gum, 10% by weight of boiled China-wood oil containing about .06% of cobalt paste as a drier, and about 5% by weight of "Halowax" (chlorinated naphthalene) such as is discussed in detail in applicant's Patent No. 2,028,782. This saturant is of course merely illustrative of one material which may be used to harden the sheet and increase its wear.

With reference to Figs. 4 and 5, it will be seen that the finished product, as illustrated in these highly magnified sectional views, has an irregular rippled nap surface which renders the material very soft and gives a highly pleasing decorative effect.

In Fig. 5, it is noted that the sheet is provided on both sides with a rippled nap surface which, as described above, may be produced by substantially repeating the process described in connection with the rippling of the sheet, as shown in Figures 3 and 4.

Fig. 8 shows a plan view of the sheet which has been rippled by the reciprocating doctor blade, and it is noted that it not only has the transverse ripples 9 formed by the accumulation of material against the edge of the doctor blade, but also has wavy lines 18, which are formed by the notches in the modified form of doctor blade 10. This modification is thought to improve slightly the decorative effect and give additional roughening to the sheet surface.

If the impregnation of the sheet with the saturant tends materially to impair the nap sur-

face, the sheet may then be passed underneath rotating wire brushes, as taught in Patent 1,998,780 to restore the natural nap surface.

In the modification shown in Fig. 2, the material to be treated passes directly from the roll 1 under the doctor blade and then through the stack of driving rolls 5, and then to the roll 7. It will be seen that in this modification, the rolls 5 serve not only as driving rolls, but also serve to govern the tension of the sheet 3 whereas in the apparatus shown in Fig. 1, the rolls serve only as driving rolls.

In accordance with another optional treatment, a sheet of felt like material of a fibrous nature, as for example a sheet of cotton linters, may be subjected to the rippling treatment. Any of these sheets may be first subjected to a saturant of material serving to make the fibers sticky, thereafter tinted with printed decorative coloring penetrating into the sheet, and subsequently rolled. The rippling effect may be applied either before or after such saturation or decoration steps. Much compression or rolling after saturation tends to compact the sheet and somewhat modify the rippling action and also make it desirable to scratch the surface with wire brushes to revive the nap surface. Saturation to the extent of precluding penetration of coloring material will also preclude satisfactory rippling action.

Subsequent treatments which may be applied to the sheet either before or after the surface treatment thereof, as have been describd above, will be obvious to those skilled in the art. By way of example, the rippled sheet may be treated in accordance with the teachings of my copending application, Serial No. 659,435, filed March 2, 1933, in which the sheet is impregnated with a mixture containing equal parts of oil and volatile solvent and then later subjected to a treatment of penetrating lacquer.

From the description in the foregoing specification, it will be apparent that the herein disclosed article and method may employ fibrous felted materials of many kinds. It is essential, however, that the sheets have sufficient thickness so that the surface irregularities can be formed by actual physical displacement of the relative positions of portions of the surface of the material. It will be clear that this treatment may be practiced upon one surface of the sheet without materially affecting the opposite surface.

Many other and further modifications of the treatments disclosed herein for coloring and altering the texture of the sheet will be apparent to those skilled in the art.

What I claim is:

1. The process of preparing a decorative sheet which comprises applying decorations substantially throughout the thickness of a fibrous felted paper sheet, roughening one surface of said sheet to form ridges thereon by subjecting the surface to a scraping treatment whereby fibers are pulled up into ridges, this sequence being recurrent as applied to successive parts of the sheet surface and the result being a series of ridges, impregnating the resultant sheet with a toughening saturant, and treating said roughened surface to raise a nap thereon.

2. In the process of preparing a decorative sheet, the step which comprises subjecting a fibrous felted paper sheet to a scraping treatment to form a rippled surface thereon whereby fibers are pulled up to ridges, this sequence being recurrent as applied to successive parts of the sheet surface and the result being a series of ridges.

3. In the process of preparing a decorative sheet, the step which comprises subjecting a fibrous felted paper sheet to a scraping treatment and at the same time maintaining a tension upon said sheet whereby portions of said sheet are pulled up from the body of the sheet into ridges, this sequence being recurrent as applied to successive parts of the sheet surface and the result being a series of ridges.

4. The process of preparing a decorative sheet which comprises applying decorations substantially throughout the thickness of a fibrous felted paper sheet, roughening one surface of said sheet to form ridges thereon by moving the sheet in a given direction while subjecting the surface thereof to a scraping treatment applied at a series of spaced zones arranged in a row whereby fibers are pulled up into ridges, this sequence being recurrent as applied to successive parts of the sheet surface and the result being a series of ridges, and impregnating the resultant sheet with a toughening saturant.

5. The process of preparing a decorative sheet which comprises applying decorations substantially throughout the thickness of a fibrous felted paper sheet, roughening one surface of said sheet to form ridges thereon by moving the sheet in a given direction while subjecting the surface thereof to a scraping treatment applied at a series of spaced zones arranged in a row whereby fibers are pulled up into ridges, this sequence being recurrent as applied to successive parts of the sheet surface and the result being a series of ridges, impregnating the resultant sheet with a toughening saturant, and treating said roughened surface to raise a nap thereon.

6. The process of preparing a decorative sheet which comprises applying decorations substantially throughout the thickness of a fibrous felted paper sheet, roughening one surface of said sheet to form ridges thereon by moving the sheet in a given direction while subjecting the surface thereof to a scraping treatment applied at a series of interrupted spaced zones arranged in a row whereby fibers are pulled up into ridges, this sequence being recurrent as applied to successive parts of the sheet surface and the result being a series of ridges, and while said sheet is undergoing the said treatment changing the relative position of the scraping instrumentality and the sheet in a direction transverse to the first mentioned direction of movement of the sheet and with respect to the said interrupted spaced zones and thereby forming ridges extending transversely to said first mentioned ridges, and impregnating the resultant sheet with a toughening saturant.

7. The process of preparing a decorative sheet which comprises applying decorations substantially throughout the thickness of a fibrous felted paper sheet, roughening one surface of said sheet to form ridges thereon by moving the sheet in a given direction while subjecting the surface thereof to a scraping treatment applied at a series of interrupted spaced zones arranged in a row whereby fibers are pulled up into ridges, this sequence being recurrent as applied to successive parts of the sheet surface and the result being a series of ridges, and while said sheet is undergoing the said treatment changing the relative position of the scraping instrumentality and the sheet in a direction transverse to the first mentioned direction of movement of the sheet and

with respect to the said interrupted spaced zones and thereby forming ridges extending transversely to said first mentioned ridges, impregnating the resultant sheet with a toughening saturant, and treating said roughened surface to raise a nap thereon.

8. A new article of manufacture comprising a fibrous felted paper sheet, one side of said sheet having a nap surface, said nap surface having the contour of a plurality of irregular ridges and valleys therebetween having the appearance of ripples, the surface of the ridges being gradually inclined to the crest on one side and sharply inclined on the other side.

9. A new article of manufacture comprising a fibrous felted paper sheet having decorations extending substantially through the thickness thereof, one side of said sheet having the contour of a plurality of irregular ridges and valleys therebetween and having the appearance of ripples, the crest of the ridges occupying a minor portion of the surface area of the sheet and the valleys between the ridges being relatively wide as compared to said crests.

10. A new article of manufacture comprising a fibrous felted paper sheet having decorations in designs extending substantially through the thickness thereof, one side of said sheet having the contour of a plurality of irregular ridges and valleys therebetween and having the appearance of ripples, the crest of the ridges occupying a minor portion of the surface area of the sheet and the valleys between the ridges being relatively wide as compared to said crests.

11. A new article of manufacture comprising a fibrous felted paper sheet having decorations in designs extending substantially through the thickness thereof, one side of said sheet having the contour of a plurality of irregular ridges and valleys therebetween and having the appearance of ripples, the crest of the ridges occupying a minor portion of the surface area of the sheet and the valleys between the ridges being relatively wide as compared to said crests, said sheet being impregnated with a toughening saturant.

12. A new article of manufacture comprising a fibrous felted paper sheet, decorative coloring extending substantially through the thickness thereof, and a toughening saturant impregnated into said sheet and substantially through the same, one side of said sheet having a nap surface and a contour of a plurality of irregular ridges and valleys therebetween having the appearance of ripples, the crest of the ridges occupying a minor portion of the surface area and the valleys between the ridges being relatively wide as compared to said crests.

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