Patented Feb. 3, 1948 2,435,209

UNITED STATES PATENT OFFICE

2,435,209

METHOD OF MAKING FLEXIBLE VENEER LAMINATE

Armin Elmendorf, Winnetka, Ill., assignor to The Flexwood Company, a corporation of Illinois

No Drawing. Application August 23, 1944, Serial No. 550,867

1 Claim. (Cl. 154—132)

1

In my prior Patent No. 1,819,775 there is disclosed a composite sheet material, consisting of thin wood veneer bonded to a flexible backing; the veneer being in a ruptured state so that it no longer constitutes a continuous membrane, but consists of a mass of narrow strands or filaments which are not completely separated from each other. Although this material has been and is being widely used, the field of usefulness would be much greater except for certain conditions inherent in the material that militate against a wider use.

The object of the present invention is to improve the aforesaid material so as not only to open wider fields of use therefor, but also to achieve more satisfactory results wherever it is used.

A further object is a novel method of making the composite flexible sheet material to make certain that the material will always have the new, desirable characteristics.

Flexwood is used mainly as a wall covering and, to be of maximum benefit to the public, the ordinary skilled paper hanger should be able to apply it. However, it has heretofore been found necessary to train specialists in the art of satisfactorily applying Flexwood to walls.

Viewed in one of its aspects, the present invention may be said to have for its object to improve Flexwood in such a manner and to such an extent that the ordinary skilled paper hanger shall not only be able to apply it, but need not learn other skills or employ other tools than those with which he is already equipped.

One of the difficulties heretofore encountered in the use of Flexwood is the development of blisters after application to a wall. There are two main causes for this. If the adhesive is not uniformly distributed on the wall, so that there are scattered poorly bonded areas, the poor bonding usually will not be discovered until a day of high humidity comes. When that happens, the wood absorbs moisure and, in the areas of poor bonding, swells and separates the Flexwood from the wall; the result being blisters which do not subside completely upon drying of the wood but remain permanently visible.

Blisters also result from the presence of cockles in the veneer, these being little bulged or wavy areas created by irregularities in the grain direction of the wood. The cockles are flattened in applying the Flexwood to the wall, thus setting up in the wood stresses that are generally great enough eventually to separate the sheet from the wall in spots and causing many troublesome blisters.

Viewed in another of its aspects the present invention has for its object to reduce the danger of blistering from either of the aforesaid causes to a point where it is practically eliminated.

2

In its most highly developed form my invention contemplates also an improved finish on the face of the veneer. Heretofore the veneer has simply been sanded in the process of manufacture and, after having been applied to a wall, has been coated with lacquer or varnish; the ordinary paper hanger rarely doing a good finishing job because he is not a wood finisher, neither by training nor experience.

Viewed in still another of its aspects my invention may be said to have as its object to produce a prefinished product or one which, at least, is better suited than heretofore to being finished after it is on a wall.

One reason why the ordinary paper hanger has not been able to hang Flexwood as he does wall paper, is that Flexwood is stiff in contrast to the fairly soft state in which wall paper is after being coated with paste. Therefore he cannot work Flexwood easily into corners, nor trim it by running a knife over the same along a base board, door or window frame or other shoulder against which the material is to be fitted. The first thing to be considered in this connection is the thickness of the veneer. The thinner the veneer the more pliable it is; but if it is too thin little granules and surface defects present on the underlying wall will show through. From my researches I have found that the veneer should not be less than .01 inch or more than .02 inch thick, although with some woods satisfactory results have been obtained with a veneer thickness of one fortieth of an inch.

The likelihood of blisters occurring can be reduced if the finished product on the wall will not expand materially upon becoming wet. Impregnating the veneer with synthetic resin partially accomplishes this purpose but leaves the veneer too brittle. In accordance with my invention I apply the veneer to the backing while it is wet and fully expanded, and I dry it and bond it under constraint; so that upon removing the composite sheet from the press the veneer is only one or two percent narrower than it was in its green state. When the press is opened and the constraint on the veneer is released, the veneer contracts elastically to the extent of one or two percent of the width of the same in the green state. I have found that veneer bonded to a backing and dried in this manner expands only about one fourth as much as does veneer dried first and then bonded as heretofore. Hence the great reduction in the tendency to produce blisters after application to a wall which I have noted with my improved product.

Heretofore it has always been the practice to bond the veneer to the backing while the veneer is dry, in order to avoid penetration of the glue through the veneer. I have discovered that even if a water soluble glue is spread over the backing,

the wet thin veneer may be bonded satisfactorily if the glue coat is dry at the time without causing staining nor penetration through the backing if the adhesive be sparsely applied over a foundation coat that is appreciably less hygroscopic and less water soluble than the bonding coat.

The veneer need not contain all of its original moisture at the time of bonding, but the moisture should not be appreciably below the fiber saturation point which is of the order of 25% to 30%. For the veneer bonding coat I prefer to use from five to ten pounds of glue in liquid form to cover one thousand square feet of backing; the glue consisting of one part of dry animal glue to three parts of water. This is preferably applied over a dry foundation coat that will block the absorbing of the adhesive by the backing; as, for example, a coat of urea adhesive properly cured. After the bonding coat has dried, a sheet of the backing material and a sheet of wet veneer are assembled and placed in a hot press. The backing should rest on a ventilating plate or screen to provide for the escape of moisture during the pressing operation. Where a screen is used it should not be coarser than a 30x30 mesh and preferably a 50x50 mesh or finer. Between the veneer and the upper platen of the press I place a polished plate of metal that is not attacked by the chemicals which come out of the wood during the bonding operation. Stainless steel is satisfactory for this purpose. In the press the assembly is subjected to a pressure adequate to produce at least 15% compression of the face veneers in about 5 minutes at a temperature of from 250° F. to 300° F. The moisture in the veneer is driven through the backing and the screen and laterally along the latter until it escapes along the edges of the sheets being dried and glued. The drying may take from one to two minutes, during which time the wood is plasticized and compressed. Following this the wood becomes case hardened, so that when the work leaves the press at the end of five or six minutes the veneer has a hardened, polished surface.

Where a wax finish is desired, any conventional wax used for waxing floors or furniture may be applied to the polished face of the plate that is to contact with the veneer. I have found that when wax is applied in this way it is transferred from the metal plate to the veneer during the operation of drying and pressing, and that the veneer upon leaving the press is waxed and finished and requires no subsequent buffing; and, further, that this is possible even though the veneer is green and wet when it comes into contact with the wax.

The pressing time may be varied somewhat, but it should always be substantially greater than the time required to bond and dry the veneer. So far as the temperature of the press is concerned, the lower the temperature the longer the time required to complete the operation; whereas, if the temperature be too high, discoloration of the wood may result. Generally, even though good gluing may be obtained at relatively low pressures, the resultant finish is dull and unsatisfactory if the final thickness of the veneer is not at least 15% less than its air-dry thickness. If the pressure be too high, so that the wood is compressed more than about 45%, there may be discoloration of the wood, or the surface of the veneer may become rough, or the impression of the wire screen may show through. While for

most veneers the range of permissible compression is from 15% to 45% below the thickness of the veneer when allowed to air dry normally, some hard woods may acquire adequate sheen when the compression is slightly less than 15%, and for some very soft woods the compression may be a little greater than 45% without introducing staining or other troubles.

Various kinds of backing materials may be employed. Good results have been obtained with thin, sized kraft paper and calendered chip paper about .009 inch thick.

Although I prefer to use animal glue to bond the veneer to the backing, almost any glue that does not stain the veneer can be used.

After the sheets leave the press they must be flexed to break up the veneer into narrow strands or filaments as described in my aforesaid patent. The strands in commercial Flexwood are not all of the same size, but they run about thirty two to the inch. This breaking up of the veneer results not only in flexing it but also in breaking into filaments any membrane finish, such as lacquer, which the veneer may have. If this were not done the moisture in the paste with which the sheet is subsequently attached to a wall would be trapped behind the veneer and could not escape to the atmosphere.

If the material is not waxed in the process of manufacture, a finish such as lacquer or varnish may be applied after the material has been bonded to a wall. Such a finish is superior to that obtained when commercial sanded Flexwood sheets are finished on the job.

When pressed as described, the veneer face is smooth and polished while the paper back is embossed. The embossing facilitates bonding to the wall and improves the flexibility of the product.

It will thus be seen that while my improvement is a form of Flexwood, it is a great improvement on the older form: it has a case hardened, polished veneer face and an embossed back; the veneer has approximately the same width that it had in its original green state, its capacity to expand has been largely nullified so that it can expand very little after application to a wall and blistering is thereby practically prevented; the veneer has been plasticized and flattened under heat and pressure; and the sheet as a whole becomes soft and limp when a wet adhesive is spread over the back preparatory to attaching it to a wall. Furthermore, it leaves the press with a wax finish, if desired, so that the expense of subsequent finishing is avoided. It should further be noted that the characteristic softness and limpness of the product at the time of applying it to a wall not only makes the application easier but permits it to be cut and trimmed in position.

It will also be seen that my method is a great improvement over the old method of making Flexwood because it plasticizes, dries, bonds and polishes the veneer all in one operation; so that I have produced not only a product which to all intents and purposes solves completely the long standing problem of blistering, but also a new method by which the cost of manufacture and finishing the product is substantially lowered as is the cost of applying it to a wall.

I claim:

The method of making a flexible, composite, wood-faced sheet of material applicable as a wall finish, and having a polished, hardened,

compressed outer wood surface, which comprises simultaneously bonding a single sheet of thin wood veneer having a moisture content approximating or exceeding the fibre saturation point, to a flexible backing, and drying the veneer and hardening and compressing the veneer, by subjecting the assembly to heat and pressure adequate to compress the veneer from 15% to 45% less than its normal air-dry thickness, while maintaining the exposed face of the wood veneer in contact with a smooth, polished plate effective to prevent the escape of steam through the face of the veneer, and employing the moisture of the veneer to plasticize the face of the veneer and to impart a hardness substantially greater than the hardness of the kiln dried wood.

ARMIN ELMENDORF.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,999,253	Norris	Apr. 30, 1935
1,870,041	Dike	Aug. 2, 1932
1,343,216	McClain	June 15, 1920
1,819,775	Elmendorf	Aug. 18, 1931
2,070,527	Elmendorf	Feb. 9, 1937
1,125,973	Davidson	Jan. 26, 1915
1,369,743	Hood	Feb. 22, 1921
1,864,812	Elmendorf	June 28, 1932
1,980,913	Doll	Nov. 13, 1934
1,744,561	Marckworth	Jan. 21, 1930
2,268,477	Elmendorf	Dec. 30, 1941

FOREIGN PATENTS

Number	Country	Date
486,619	Great Britain	June 8, 1938

OTHER REFERENCES

Trans Am. Soc. Mech. Eng., vol. 60 (1938), pp. 69–70.