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PROCESS OF AND MEANS FOR COVERING THE PARTS OF AN AIRCRAFT

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1 Claim. (Cl. 156—85)

Our invention consists in a new and useful improvement in process of and means for covering the parts of an aircraft.

This application is a continuation-in-part of our copending application Ser. No. 845,608, filed on Oct. 12, 1959, now abandoned.

This application is also a continuation of application Ser. No. 213,625, filed July 31, 1962, now abandoned.

The particularly novel feature of our invention consists in substituting for the conventional cotton and linen fabric, heretofore used as covering, a particular woven fabric consisting of glass fibers.

It has been heretofore known to use such fabric of glass fibers as a reinforcing material mounted upon the conventional cotton and linen fabrics. It is applicant's understanding that innumerable attempts have been made by many skilled in the art to produce a covering for parts of aircraft consisting of fiber glass fabric without the use of any conventional cotton or linen covering, and that all such attempts have been completely unsuccessful.

However, as a result of abundant exhaustive tests, we discovered our novel use of the particular woven fabric consisting of glass fibers, without the use of any conventional cotton or linen covering to produce the required covering. We were enabled to successfully practice our novel process by the combined use of the particular glass fiber fabric and a particular dope.

The particular fabric of glass fibers used is constructed with specifications as follows: thread count 36 x 34 per square inch, warp yarn 450/2/2, filling yarn 450/2/2, average thickness in mills 5.0, average weight per square yard 3.92 ounces, minimum average breaking strength per square inch 160 x 150 pounds, weave plain.

The particular dope used is a solution of cellulose acetate butyrate having 12% solids and a solvent.

We discovered that, when the above described fabric was treated with a series of applications of the above described dope, a completely satisfactory covering was produced. Hence, it is obvious that the novel means whereby our process has been successfully practiced is the heretofore unknown combination of the particular glass fiber fabric and the particular dope.

Our novel process consists in the following steps:

We measure the surface of each part of the aircraft which is to be covered. We then cut pieces of the fabric to fit each of said parts of the aircraft surface. We place each cut piece of the fabric on its proper part of the surface, under such tension as to remove all wrinkles from the piece of fabric. We then apply to each placed piece of fabric a solution of cellulose acetate butyrate dope having 12% solids and a solvent, holding each piece of fabric in proper position until the dope has dried by evaporation of its solvent and the piece of fabric has adhered to the part of the aircraft on which it has been placed. We then apply to each piece of fabric sufficient coats of the dope of 12% solids as to cause complete penetration of said solids of said dope remaining after the solvent has evaporated, through the weave of the fabric

as to fill all spaces between the threads of the fabric remaining after the evaporation of the solvent, thereby producing an integrated, pliable mass in which the fibers are anchored. We then apply sufficient additional coats of the dope to effect the final satisfactory degree of tautness of the treated fabric.

The said fabric pieces are thus applied and adhered to the stringers of the fuselage, the ribs of the wings and empennage. After the several portions of the fabric have been thus mounted, all overlapped joints thereof are taped with suitable strips of said glass fiber fabric and adhered thereto.

We discovered that this penetration of the dope into the fabric effects the heretofore unknown result of the production of the solid mass of residue of the dope in which the individual fibers of the fabric are anchored so as to product the integrated mass. It is to be understood that such a mass has the desired degree of pliability.

We discovered that a sufficient number of additional applications of the dope so affected this integrated mass as to produce the final satisfactory degree of tautness of the covering. It has been our experience that the satisfactory practice of our novel process is secured by at least four applications of the dope, to produce the integrated mass, and four further applications to secure the final degree of tautness.

The immense value of our invention is based upon the following fundamental characteristic which differentiate our improved covering from the conventional covering composed of cotton or linen:

Our improved covering comprising the integrated mass of fiber glass fabric and dope is resistant to weather conditions, decay or chemical damage. It is fire resistant. It has a safety factor, proven by exhaustive tests, such as its tensile strength exceeding over 100 pounds as against 80 pounds for cotton fabric; tear test 12 pounds, as against cotton 5 pounds.

Moreover, experience has shown that cotton covering requires from 12 to 15 applications of dope to produce an opaque coating, to prevent deterioration of the coating by light, while our covering, being resistant to light, requires no such opacity. We have found that our covering is far more economical in initial cost of material and maintenance than the conventional cotton and linen.

Applicants have herein disclosed a novel method for covering parts of an aircraft which comprises placing on the aircraft surface the peculiar woven fabric having the characteristics hereinbefore enumerated, and then treating the fabric as hereinbefore described with a dope having the hereinbefore described characteristics, that said dope penetrating the weave of said fabric produces an integrated mass to anchor the fibers of the fabric.

It is believed that the prior art does not disclose either the identical or any equivalent process whereby such a covering can be produced.

Having described our invention, what we claim is:

A process of covering the parts of an aircraft which comprises measuring the surface of each part to be covered, cutting a piece of woven fiber glass fabric to fit said surface, placing said piece of fabric on said surface under tension to remove all wrinkles, applying to said piece of fabric a coating of cellulose acetate butyrate dope having 12% solids and a solvent, holding said piece of fabric in position until the dope has dried by evaporation of the solvent and the piece of fabric adheres to the surface on which it is placed, applying sufficient coats of said dope to said piece of fabric as to give complete penetration of said solids remaining after the solvent has evaporated, through the weave of the fabric as to fill all

spaces between the fibers of said fabric, thereby producing an integrated, pliable mass in which said fibers are anchored, and applying sufficient additional coats of said dope to said piece of fabric as to effect the final satisfactory degree of tautness of said piece of fabric, said woven fiber glass fabric consisting of impermeable glass threads having a thread count of 36 x 34 per square inch, warp thread 450/2/2, filling yarn 450/2/2, thickness in mills 5.0, weight per square yard 3.92 ounces, minimum average breaking strength per square inch 160 x 150, weave plain.

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