

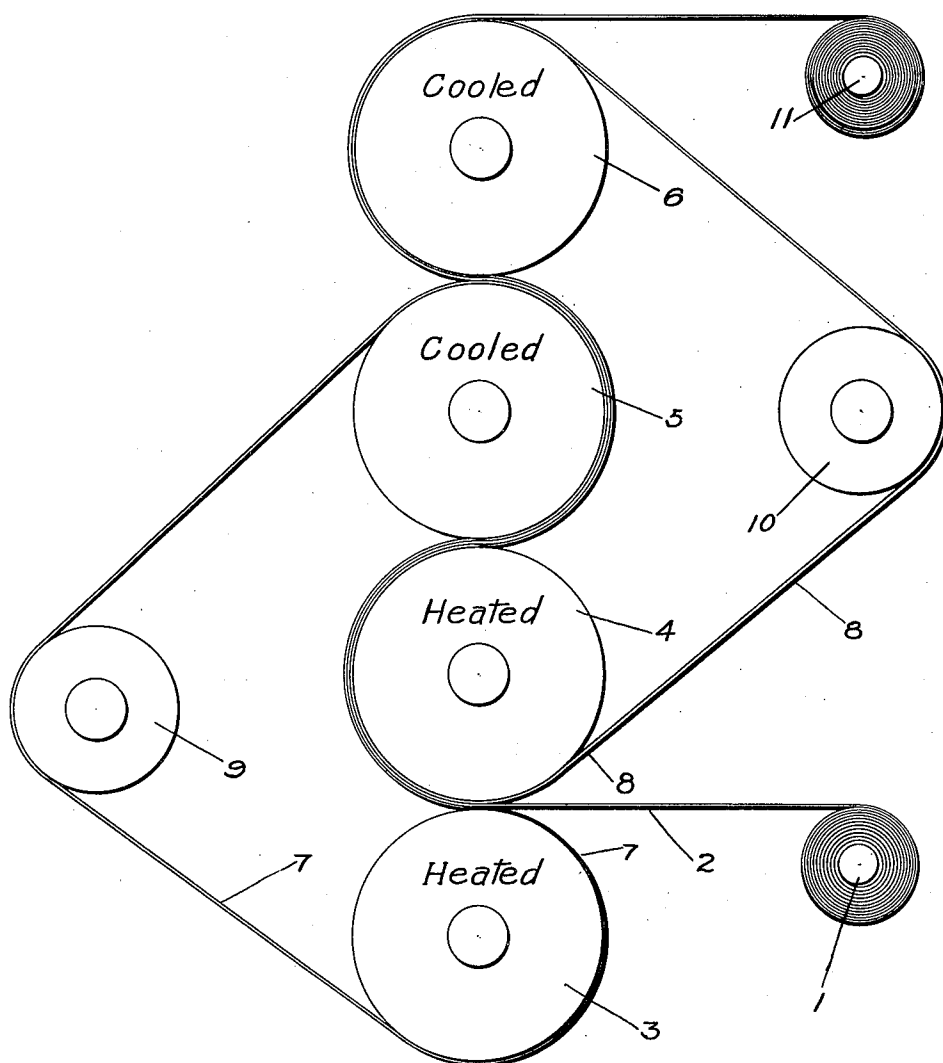
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N. S. CLAY

AIRPLANE COVERING MATERIAL

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# UNITED STATES PATENT OFFICE.

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## AIRPLANE-COVERING MATERIAL.

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*To all whom it may concern:*

Be it known that I, NOBLE S. CLAY, a citizen of the United States, and a resident of Wilkesburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Airplane-Covering Materials, of which the following is a specification.

My invention relates to airplane covering material, more especially to a wing and fuselage covering of fibrous material and a binder.

Heretofore, airplane covering materials consisted of finely woven textile fabrics, such as linen, cotton, or silk, which was stretched across the wing and fuselage structure and fastened securely thereto by tacking or sewing. To obtain increased rigidity, the stretched fabric was treated with so-called "dope" which had the characteristic of shrinking the fibers, thereby providing a taut smooth surface. Another object of "doping" the fabric was to preserve it from deterioration.

It was found, however, that fabric treated in this manner was not protected against moisture, atmospheric changes, or the destructive effects of the sun's rays. The changes induced by these elements deteriorated the fibers, making the cloth flabby and, consequently, increased its resistance to the passage of air thereover. The so-called "doping" agents commonly consisted of cellulose acetate or cellulose nitrate. They are not fire resistant, and the cellulose nitrate, especially, is highly inflammable, making the use of it exceedingly dangerous.

My invention obviates these difficulties, it being among the objects thereof to provide an airplane covering material which is mechanically strong, durable, non-porous, and offers little resistance to air.

It is another object of my invention to provide a covering material that is self-sustaining and does not require tension on the fibers to keep the material taut.

It is a further object of this invention to provide fireproof covering material for the parts of airplane structures exposed to the dangers of heat and flame.

It is a still further object of my invention to provide means for molding thin sheets of fibrous material adapted for use as airplane covering.

In practicing my invention, I utilize fine-

ly woven linen, cotton or other fabric which may be superposed in multiple layers, with the weave staggered to obtain maximum strength and sewed together, or I may utilize a single layer of fabric of a heavier weave. I may also employ composite materials, such as combinations of asbestos and fabric. The individual or multiple layers of material are impregnated with a binder, preferably a phenolic condensation product, and molded under heat and pressure. When it is desired to obtain colored material, I employ a colorless phenolic condensation product as a binder so that the molded sheet retains the original color of the fibrous sheet material, which color may be natural or artificially applied thereto. The materials above mentioned may be treated with fireproofing agents, such as inorganic salt solutions, before impregnating with the binding material.

The accompanying drawing, forming a part hereof, is a diagrammatic view of an apparatus adapted for molding thin sheets in accordance with this invention.

I provide a roll 1 of fibrous sheet material 2 impregnated with a binder, preferably a phenolic condensation product, which is placed in suitable relation to a number of rolls 3, 4, 5 and 6 co-operating with a pair of endless guide belts 7 and 8, passing over guide wheels 9 and 10, respectively.

The endless guide belt 7 passes around the pressure roll 3, over the roll 4, around the roll 5 and over guide wheel 9. The endless guide belt 8 passes around the roll 4, over the roll 5, around the roll 6 and over the guide wheel 10.

The guide belts 7 and 8 form a pressure platen arrangement for the sheet material to be molded. The rolls 3 and 4 are heated and 5 and 6 are cooled to alternately heat and cool the guide belts in passing there-through.

The treated sheet material 2 consisting of one or more layers is inserted between the engaging surface of the guide belts 7 and 8 and is passed between the heated pressure rolls 3 and 4, around the heated roll 4 and the cooled rolls 5 and 6, compacting the material to a hardened unitary layer which is wound on the roll 11.

Although I have described a specific embodiment of my invention, it will be obvious to those skilled in the art that I may em-

ploy other means of molding elongate bodies of fibrous sheet materials, as by forming them between the platens of a hydraulic press. I may employ any one of a number of fibrous sheet materials, such as textile fabrics, asbestos paper or fabric, wood veneer, paper and the like. In place of the phenolic condensation product, I may employ other suitable binders, such as shellac, albumen, casein or blood glues of desirable quality. Instead of superposing a plurality of layers of fibrous sheet material to form the desired thickness, I may utilize a multiple ply cloth, such as three-ply balloon cloth or other standard airplane covering.

It will be readily seen that my invention provides a simple and continuous process for producing elongate bodies of molded sheet material. The material so produced has numerous advantages over substances heretofore employed for airplane covering, the most notable of these being the following: It is non-hygroscopic, is not affected by high temperatures, does not fuse, will not deteriorate under atmospheric changes and is mechanically superior to materials heretofore employed.

I claim as my invention:—

1. In an apparatus for molding, a series of pairs of pressure rolls co-operating with a pair of endless guide belts, and means for heating and cooling certain of said rolls.

2. In an apparatus for molding, a series of pressure rolls, a pair of co-operating guide belts passing around and between said pressure rolls, and means for heating the first and cooling the last of said rolls.

3. The method of molding an elongate body of fibrous sheet material which comprises passing treated sheet material be-

tween the surfaces of a pair of endless guide belts co-operating with a series of pairs of pressure rolls, some of which are heated and others cooled.

4. A method of molding an elongate body of fibrous sheet material which comprises passing a plurality of sheets of treated material between the surfaces of a pair of endless guide belts co-operating with a series of pairs of pressure rolls, some of which are heated and other cooled.

5. A method of molding an elongate body of fibrous sheet material which comprises passing sheet material impregnated with a phenolic condensation product between the surfaces of a pair of endless guide belts co-operating with a series of pressure rolls, some of which are heated and others cooled.

6. A method of molding an elongate body of fibrous sheet material which comprises passing asbestos paper and fabric impregnated with a phenolic condensation product between the surfaces of a pair of endless guide belts co-operating with a series of pressure rolls, some of which are heated and others cooled.

7. A method of molding an elongate body of fibrous sheet material which comprises passing sheet material treated with a solution of an inorganic salt and impregnated with a phenolic condensation product between the surfaces of a pair of endless guide belts co-operating with a series of pressure rolls, some of which are heated and others cooled.

In testimony whereof, I have hereunto subscribed my name this 5th day of January, 1921.

NOBLE S. CLAY.