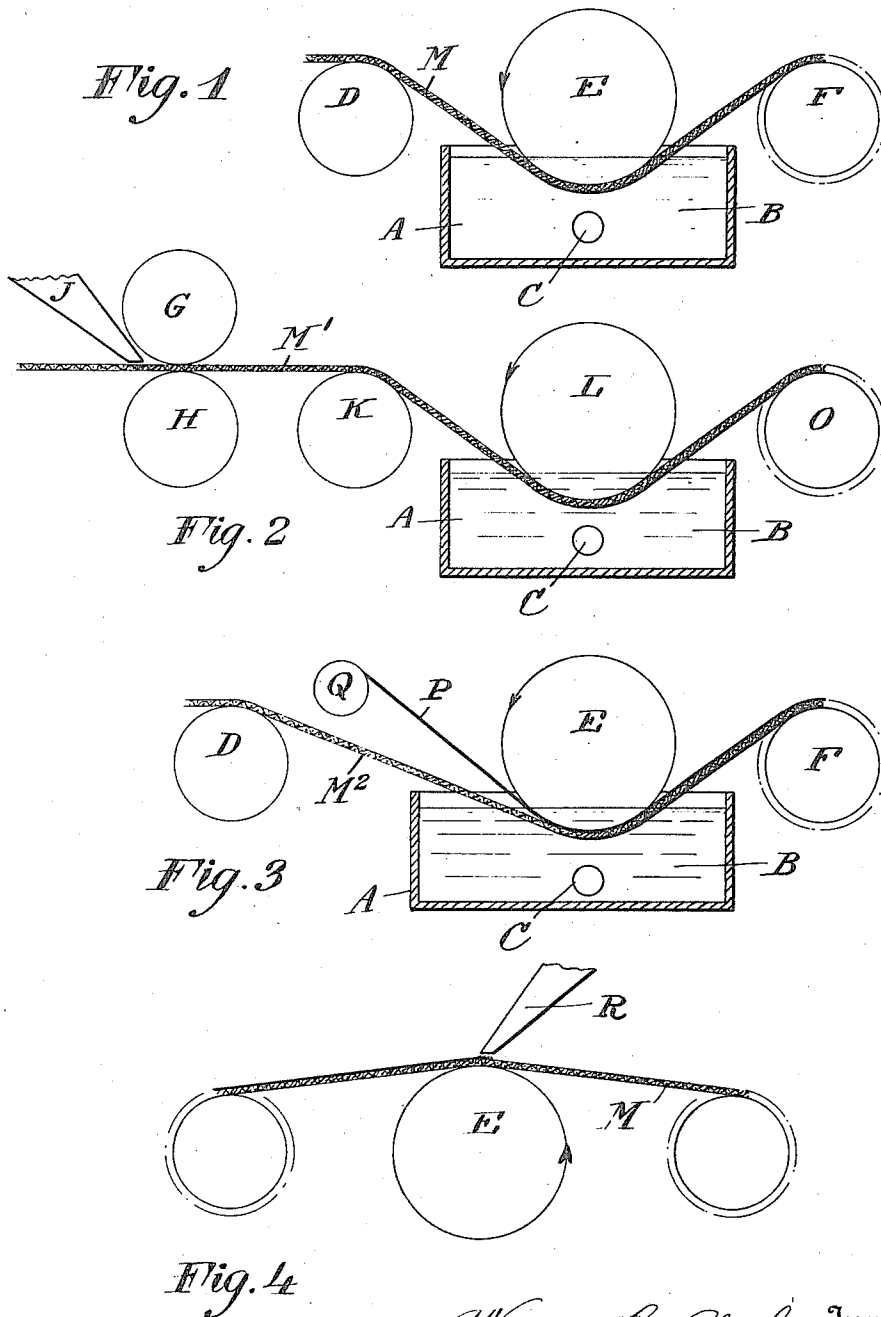


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COVERING MATERIAL FOR AIRCRAFT AND METHOD OF MAKING SAID MATERIAL.
APPLICATION FILED JULY 8, 1916.

1,243,041.

Patented Oct. 16, 1917.



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UNITED STATES PATENT OFFICE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WALTER G. CLARK, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Covering Material for Aircraft and Methods of Making Said Material, of which the following is a specification, accompanied by drawings.

This invention relates to covering material for aeroplanes, balloons or other air craft, or for any other purpose where a thin, light, strong and air tight covering is necessary, and where skin friction is a consideration which makes a smooth surface highly desirable.

The basis or foundation of the material consists of a web of wire-mesh or net, which may be of fine wires, either steel, copper, brass, bronze or any other suitable material to which a deposit of metal applied electrically or by well-known spray methods, will adhere firmly. Upon this foundation web of netting, a continuous surface of metal is formed bridging the openings or mesh between the wires, and thus making a sheet of metal supported upon and firmly adherent to the wire web. The metal deposited electrically or otherwise, may be either copper or nickel or any other suitable metal that is capable of being formed on the web in a smooth even film, but the metals mentioned, or a combination of the two, are preferred, on account of the ease with which they may be deposited and because of the strength of the metallic film so formed.

The invention accordingly comprises the features of operation, the steps and the sequence of steps which are exemplified in the structures hereinafter described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, showing one or more of various possible embodiments of this invention,

Figure 1 is a side elevation of apparatus for depositing a layer of metal on the web, after the web has first received a preliminary treatment with filling material, such as varnish;

Fig. 2 is a similar view of apparatus for depositing a layer of metal on the web, after the web has received a preliminary treatment with a suitable paste;

Fig. 3 is a similar view of apparatus for forming a surface on the web by means of a thin sheet of metal or foil, and locking the sheet of metal or foil to the web by electro-deposition, and

Fig. 4 is a similar view of apparatus for forming a coating or layer of metal on the web, by means of a spray of metal.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

First method.—A coating of varnish or collodion or any other suitable filling material of similar nature, which is insoluble in water, is applied to the wire mesh in such manner that it closes all the openings between the wires over substantially the entire surface area of the web. After this coating is applied, one of the surfaces is cleaned, exposing the wires, and a conducting material is buffed or rubbed into the surface of the filling material. This conducting material may be either a metallic powder or graphite, or any other suitable material, which can be applied to the surface of the varnish or coating, and is a conductor of electricity. The web or wire net is then placed in or run through an electroplating bath and the entire surface is plated with the metal to be deposited.

Fig. 1 shows a plating bath A having a suitable electrolyte B and an electrode C. The wire mesh M properly treated as described, is run through the bath from the roll D, over the roller E, to the rewinding roll F. The roller E forms the other terminal of the circuit, and a film or coating of metal is deposited on the prepared side of the wire mesh.

Second method.—Instead of using varnish, a paste made of finely divided metals mixed with a simple binder, may be spread smoothly over the mesh, either by spreading the same under moderate pressure, or by passing the wire mesh and the filling material between rolls. One of the surfaces is then cleaned to insure that the wires will be

exposed, and the webbing thus filled is passed through an electroplating bath, as described.

In Fig. 2, G and H represent rolls between which the wire mesh M' passes, and J represents a nozzle or pot for feeding the paste to the mesh between the rolls. The mesh passes over a roller K and around a drum L to the rewinding roll O. In so passing, the mesh dips into the electroplating bath B, as in Fig. 1.

In either method illustrated in Figs. 1 and 2, after a continuous metallic surface is secured by depositing a metal over the surface of the filled web, the plated web is then passed through a suitable solution, which will dissolve the varnish or collodion or the binding material contained in the metallic paste, and when the filling material has been entirely removed, the web and its surface are then in condition to be used; or the material may be strengthened by again passing the web through a plating bath and depositing another coating of metal on the back or reverse side opposite to that which received the first deposit; or an additional film may be deposited on both sides in this second operation, but such second operation is not essential, except where it is desired to reinforce and strengthen the surface originally produced.

Third method.—The metallic surface may also be obtained by firmly pressing upon the surface of the web a thin sheet of metal, such as tinfoil or silver foil or any other very thin metallic film of suitable metal, and then locking this film to the web by depositing metal on the reverse side, thereby locking the surface of film firmly to the wires.

In Fig. 3, the web M² is shown passing from the roll D, over the roller E, through the bath B, to the rewinding roll F. The thin sheet of metal or foil P passes from the roll Q over the roller E, between the surface of said roller and the web M², and the rewinding roll F takes up both the web M² and the foil P. The web M² is placed under sufficient tension to press the foil or thin sheet of metal P tightly against the same, and the electro deposit of metal from the bath B firmly locks the foil to the web.

As a modification of these methods, the metallic surface film may be formed by spraying heated metal upon the treated web, as shown in Fig. 4, in which the web M after preliminary treatment with varnish or the like, or metallic paste, or with this sheet metal or foil pressed against the same is passed over a roller E or over a table, and metal is sprayed onto the web from a suitable sprayer R in a well-known manner, thus forming the continuous metallic surface on the web, as before.

The color of the surface deposit may be

controlled by controlling the metal deposited, or the rate of deposition, or by depositing a combination of more than one metal, as desired.

The covering material produced by the hereindescribed method, has the advantages of being thin, strong and non-combustible. It can be produced either in continuous lengths or in continuous sheets of any reasonably desired area. The wire mesh provides a strong support which is strengthened by the material deposited, which is firmly attached to and homogeneously incorporated with the material of the wires.

In view of the above, it will be seen that the several objects of this invention are achieved, and other advantageous results attained.

As various possible embodiments might be made of the above invention and as various changes might be made in the embodiments above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim and desire to obtain by Letters Patent the following:

1. The method of making air tight sheet material, which consists in applying a temporary plastic filling material insoluble in water, to substantially the entire surface area of a foundation of fine metallic wire mesh to close all the interstices of the mesh substantially flush with the surface of the web, cleaning one surface of the said sheet so formed to expose the metallic wires throughout the surface, spreading a layer of conducting material over the entire cleaned surface of the filling material, applying and incorporating a continuous smooth, even and unbroken metallic film upon the entire surface of said conducting material and upon the wires of said mesh throughout the entire surface of the side so prepared, and then removing the filling material, whereby the foundation of wire mesh is left with a continuous unbroken air tight surface coating of metal adherent thereto.

2. The method of making air tight sheet material, which consists in filling all the interstices of fine metallic wire mesh or web over its entire surface, with temporary filling material insoluble in water and having a conducting surface, depositing a continuous surface layer of metal upon the entire surface of said filling material, in such manner as to cause said metallic layer to adhere closely to the wires of the web throughout its entire area, and then removing the filling material.

3. An air tight covering material, comprising a foundation web of fine metallic woven wire having a thin, smooth, even film

of metal adherent to and incorporated with the wires of the web throughout its entire surface area and filling all the interstices of the web, thereby forming an air tight surface of metal supported by the web.

4. An air tight covering material comprising a web of fine metallic woven wire having a continuous metallic surface covering substantially one entire side, locked to the web by means of a continuous deposit of

metal adhering to the metallic surface throughout its area and to the wires of the web on the opposite side of the web.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WALTER GORDON CLARK.

Witnesses:

A. C. PARHAM,
M. M. RIEMANN.