Oct. 28, 1924. 1,513,696

F. DEMEL

MANUFACTURE OF GOLD LEAF

Filed Oct. 29, 1923

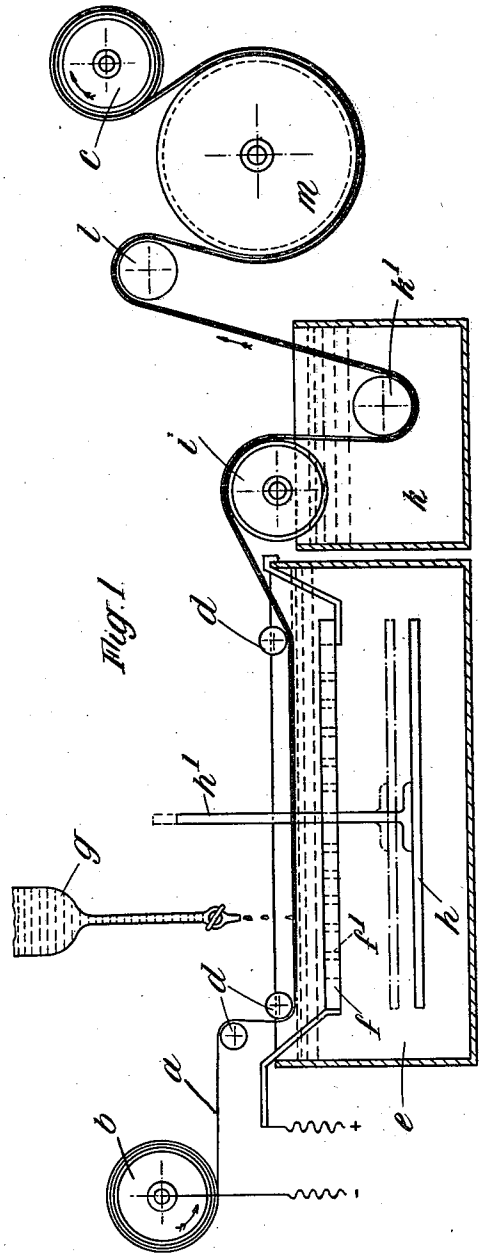


Fig. 1.

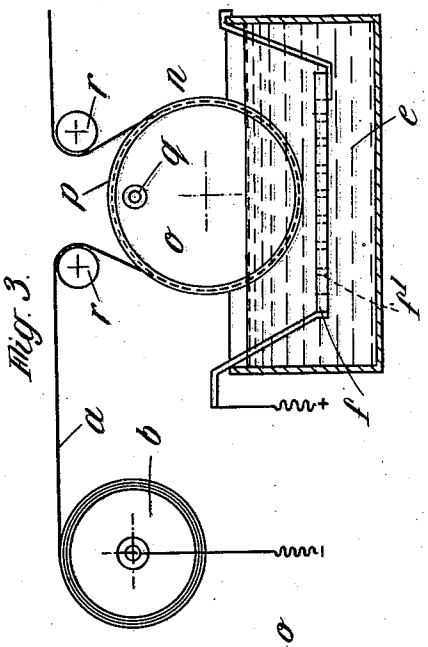


Fig. 3.

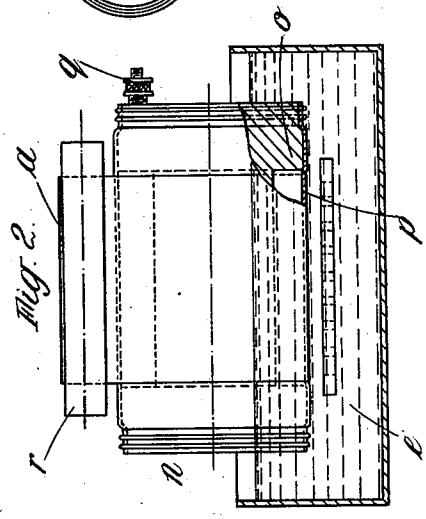


Fig. 2.

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Patented Oct. 28, 1924. 1,513,696

UNITED STATES PATENT OFFICE.

FRIEDRICH DEMEL, OF TWICKENHAM, ENGLAND, ASSIGNOR OF ONE-HALF TO RICHARD TINDALL LEIGHTON, OF HOVE, SUSSEX, ENGLAND.

MANUFACTURE OF GOLD LEAF.

Application filed October 29, 1923. Serial No. 671,550.

To all whom it may concern:

Be it known that I, FRIEDRICH DEMEL, a subject of the King of Great Britain, residing at Twickenham, England, have invented certain new and useful Improvements Relating to the Manufacture of Gold Leaf, of which the following is a specification.

In United States Specification No. 198,209 dated 3rd October 1877 is described a process for making gold leaf by electrolytic deposition of gold. In principle the process consists in depositing the metal upon a suitable substance and subsequently removing such substance by heat or solvent. Copper in thin sheets is stated to be a suitable substance; the gold is to be deposited on one side of the sheet which is then to be floated copper side downwards upon a bath of dilutenitric acid; the acid dissolves the copper, leaving the gold floating in the form of leaf.

The statement is not sufficient to enable the reader to make gold leaf because it contains no direction as to how the copper sheet is to be gilded.

It is essential that the gilding shall be strictly confined to one face of the base metal, and since the other face has to be dissolved protective varnishes or the like are out of the question or greatly complicate the operation.

By this invention a band or strip of base metal unprotected by varnishes or the like is gilded on one face only by bringing the face which is to be gilded into contact with an electrolytic bath under such conditions that the liquid cannot flow over the edges of the band on to the face which is to remain without gilding.

In the accompanying diagrammatic drawings, Fig. 1 represents a sectional elevation of one form of apparatus suitable for carrying out the invention and Fig. 2 is an end view and Fig. 3 a side view of a modified portion of the apparatus.

In Fig. 1, a silver band *a* which conveniently is not less than 0.0005 inch or more than 0.001 inch, is originally wound up on drum *b* and is unwound therefrom by being wound up on drum *c*. As it leaves the drum *b* it is guided by rollers *d* on to the surface of a bath of gold solution *e* which may suitably contain 4 grams of the double cyanide of gold and potassium per litre. The liquid is prevented by surface tension effects from flowing onto the upper surface of the band. The surface of the band which is in contact with the surface of the liquid is made a cathode by connecting the metallic drum *b* with the negative terminal of a source of electric current. The anode is a carbon plate *f* perforated as at *f'* and immersed in the gold solution at a short distance from the surface of the solution; it is connected with the positive terminal of the source of electric current. Suitable electrical conditions are an E. M. F. of 1.5 volts and a current density of 0.08 ampere per square decimetre of the silver cathode. To ensure uniform maintenance of these conditions and consequent uniform thickness of the deposited film of gold, and also to compensate for the liquid carried from the bath by adhesion to the band, a solution of the double cyanide of gold of the same strength as that of which the bath was made should be allowed to drop continuously into the bath from a vessel such as *g* at the rate found to be necessary. In order to keep the bath as homogeneous as possible in respect of its composition an agitator *h* consisting of a plate of about the same dimensions as the anode *f* may be raised and lowered continuously or intermittently by any suitable mechanism operating on its stem *h'* but not indicated in the drawing; the perforations in the anode permit passage of the solution during the up and down movement of the agitator.

As the gilded silver band leaves the electrolytic bath it passes over a guide roller *i* into a bath of water *k* and then round a roller *k'* submerged in this water. It now leaves the water and is guided by a roller *l* on to a drying drum *m* suitably heated by steam, electric current or otherwise, from which drum it is wound on the drum *c*.

Figs. 2 and 3 illustrate a modified method of carrying out the invention, in which the face of the band which is to remain ungilded is pressed against a drum having an elastic surface, in which the edges of the band are more or less embedded thus preventing flow of liquid onto the said face. The drum *n* consists of a spool-shaped core *o* slipped into a rubber tube *p* which is tied tightly on to the ends of the spool. There is thus formed a pneumatic cushion which can be inflated through a valve *q* of well-known construction. The band *a* is caused by rollers *r* to pass around the greater part of

the drum which revolves in the bath *c*. The rest of the apparatus resembles that shown in Fig. 1.

It has been assumed in this description that pure gold leaf is to be made. Commercial gold leaf is strictly speaking an alloy and when this is required the electrolytic bath must be so modified in composition that gold alloyed or mixed with the requisite other metal or metals, such as copper or silver or both is deposited. The necessary modifications are known to electro-gilders and need not be detailed here since they have nothing to do with the invention.

Having thus fully described the nature of my said invention and the best means I know for carrying the same into practical effect, I claim:—

1. Apparatus for electrolytically gilding on one surface a band of base metal, of which band the other surface is unprotected by an adhesive coating, comprising an electrolytic bath and means for causing the band to travel through the bath with one only of its faces in contact with the electrolyte.

2. Apparatus for electrolytically gilding on one surface a band of base metal, of which band the other surface is unprotected by an adhesive coating, comprising an electrolytic bath and means including an elastic surface against which one face of said band bears, said means and said band being together movable through said bath.

3. Apparatus for electrolytically gilding on one surface a band of base metal, of which band the other surface is unprotected by an adhesive coating, comprising an electrolytic bath, a drum partly immersed in said bath and free to rotate about its axis, said drum having an elastic surface on its periphery, means for causing the metal band to travel through said bath, and means for causing one face of the immersed portion of the band to press against the elastic surface of said drum.

4. Apparatus for electrolytically gilding on one surface a band of base metal, of which band the other surface is unprotected by an adhesive coating, comprising an electrolytic bath, a drum partly immersed in said bath and free to rotate about its axis, said drum having an elastic surface on its periphery, guide rollers over which the metal band passes for causing the band to lie partly in the electrolyte with one face of the portion which is immersed pressed against the elastic surface of said drum, and means for imparting longitudinal movement to said bands.

5. Apparatus for electrolytically gilding on one surface a band of base metal, of which band the other surface is unprotected by an adhesive coating, comprising a bath containing a solution for the electrodeposition of gold, a horizontally disposed drum partly immersed in said solution and free to rotate about its axis, said drum having an elastic surface on its periphery, a roller from which the metal band is unwound, a roller upon which said band is wound, one of the said rollers being electrically conducting, means for connecting the electrically conducting roller to the negative pole of a source of electricity, guide rollers over which said band passes and causing said band to lie partly in the solution with one face of the immersed portion pressed against the elastic surface of said drum, an electrode in the solution connected with the positive pole of the source of electricity, and means for causing the metal band to travel from the unwinding roller to the winding roller.

In testimony whereof I have signed my name to this specification.

FRIEDRICH DEMEL.