UNITED STATES PATENT OFFICE.

ERWIN RICHARD LAUBER AND ROBERT VICTOR NEHER, OF EMMISHOFEN, SWITZERLAND.

METHOD FOR PRODUCING BANDS OF ALUMINIUM.

Specification of Letters Patent. Patented May 8, 1917.

1,225,044.

No Drawing. Original application filed September 21, 1911, Serial No. 650,505. Divided and this application filed February 12, 1915. Serial No. 7,914.

To all whom it may concern:

Be it known that we, ERWIN RICHARD LAUBER, a subject of the Emperor of Germany, and ROBERT VICTOR NEHER, a citizen of the Republic of Switzerland, both residing at Emmishofen, Switzerland, have invented new and useful Improvements in Methods for Producing Bands of Aluminium; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, being a division of our application for United States patent filed September 21, 1911, Serial No. 650505.

Methods have been proposed by which small sheets or foils of aluminium of 0.0003 inch in thickness can be produced. Methods have also been proposed by which only one band of aluminium of a thickness less than 0.0005 inch, as for instance 0.0003 inch, can be produced, which may be produced a mile, more or less in length.

According to our invention layers of bands of aluminium of a thickness less than 0.0008 inch, as for instance 0.0003 inch, can be produced.

Hitherto separate thin strips or bands of only limited length could be produced simultaneously on account of a lubricant employed such as a layer of oil, petroleum, soapy-water or the like, which was introduced between the layers of metal to prevent them from becoming rolled together. Experiments have proven that these fluids can be applied as separating layers for aluminium foil of only about 0.0008 inch thickness or more. Strips or bands of less thickness become perforated like a sieve, by the employment of these lubricants and by reason of the granulation of the metal due to the elongation before it enters the rolls. The separating fluid by its hydrostatic pressure then breaks through the weak parts of the band. A layer of lubricant, as oil, which adheres to the material from a preceding elongation exerts the same unfavorable action. Experiments have proven that the perforation by lubricant which adheres to the material from the preceding rolling begins with a thickness of the foil of 0.0006 inch.

According to our invention aluminium after being annealed by heating to 270° to 320° C. and then allowed to cool, is drawn by rolls at a high tensile strain and under a comparatively small pressure.

The material can best be elongated when annealed at the above mentioned temperature, as it then possesses the highest available tensile strength. As the material retains this strength when becoming cold again, but loses it by mechanical treatment, a repeated annealing of the material at the above mentioned temperature becomes necessary from time to time. This annealing may be performed at suitable intervals during the treatment of the material. As a consequence the aluminium band can be subjected to so high a tensile strain that it is not only elongated, but is also brought in a smooth condition to the rolls.

Bands consisting of several layers of aluminium may be produced and to avoid the drawbacks named and to permit several aluminium strips or bands of a thickness less than 0.0008 inch to be passed between rolls, a single aluminium band at the last period of rolling but before being folded into two bands and wound up, is rolled with a mixture consisting of a small amount of lubricant, as oil and a volatile solvent, as benzin, petroleum, turpentine or similar materials. So small an amount of fluid is applied that only a very thin layer of this limpid liquid and slightly adhering mixture covers the foil, when leaving the rolls. Thus a sticking of the two layers to each other is prevented and, on the other hand the layer of lubricant is too thin to perforate the foil. The same result can be obtained by introducing between the strips or bands, vapor, for instance steam, vapor of oil, alcohol, ether or benzin, so that the bands, when passing the rolls are separated from each other by a very thin and well distributed layer.

Thus for instance, the aluminium band before being rolled two-fold is freed from the oil adhering to it from the preceding rolling. This may be done by evaporating the oil, or by washing with a solvent, as benzin. Afterward a tube provided with a large number of fine openings is placed between the bands at the side where they enter the rolls. The tube which may be electrically heated is supplied with the fluid to be evaporated, alcohol or ether for instance,

and a fine layer of vapor, which exerts no hydrostatic pressure is formed thereby between the aluminium bands entering the rolls.

A very thin uniformly distributed, separating layer may also be obtained in the following manner: Bands still of so great a thickness, (0.0008 inch or more) that they are not perforated by the heavier lubricant introduced between them, are freed from their coating of lubricant or oil and wound up. An easily evaporating fluid is introduced between the layers before or as they enter the rolls. The bands after passing the rolls are wound up tight and the wound up bands, with the separating layers between the single bands, are heated so that the surplus of separating fluid is evaporated and the remaining part of said fluid in the form of vapor is equally distributed between the bands where it is condensed to a very fine separating layer. The bands separated in this manner may be rolled and drawn to 0.00025 inch, as has been proven by experiments. These bands neither stick to each other nor become perforated.

By rolling several superposed bands at the same time the product is increased, as compared with rolling single bands, moreover the product consisting of several bands stands the working process better than single bands.

What we claim is:

1. The method of producing aluminium foils in band form, which comprises lubricating the surfaces of superposed bands of aluminium, removing the excess of lubricant by washing the bands with a solvent, repeatedly subjecting the superposed strips to a rolling operation at a slight pressure while the strips are under tension to a thickness less than 0.0008 inch, and annealing the bands at intervals during the rolling operation.

2. The method of producing aluminium foils in band form, which comprises lubricating the surfaces of superposed bands of aluminium, removing the excess of lubricant by washing the bands with benzin, repeatedly subjecting the superposed strips to a rolling operation at a slight pressure while the strips are under tension to a thickness less than 0.0008 inch, and annealing the bands at intervals during the rolling operation.

In testimony that we claim the foregoing as our invention, we have signed our name in presence of two subscribing witnesses.

ERWIN RICHARD LAUBER.
ROBERT VICTOR NEHER.

Witnesses:
ERNST FISCHER,
CARL GUBECK.