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PROCESS FOR DEGREASING SHEET-LIKE
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3 Claims

ABSTRACT OF THE DISCLOSURE

Process for degreasing a rolled aluminum product which comprises mechanically removing grease from the surface of the aluminum and blowing a stream of air having a relative humidity of at least 60 percent onto the surface.

The present invention relates to the degreasing of sheet-like rolled aluminum products, in particular aluminum strips or webs of aluminum foil, and also sheets or cuts of rolled aluminum. For the sake of simplicity, the invention will be described in the following particularly with reference to aluminum strips, but the statements made herein apply also to thinner or thicker aluminum webs and to cuts of all thicknesses. Equivalent to rolled aluminum products, in the sense of the present invention, are rolled products of other nonferrous metals, such as e.g., rolled products of aluminum alloys.

As is known, rolling grease is applied during the cold rolling of aluminum sheets and foils. This grease contaminates, to a certain degree, the surface of the finished rolled product. It is, therefore, frequently necessary to remove the traces of grease before utilizing the rolled products. Depending upon the intended use of the product, this is performed in various ways and with varying success.

The simplest method is by annealing, so that any adhering grease is evaporated or burned. During this heat treatment, the aluminum becomes soft, so that this method can not be used in those cases where the aluminum is to be used in a hard rolled condition. By another method, the traces of grease are removed by means of solvents, e.g. aliphatic chlorinated hydrocarbons, by passing the aluminum strips or sheets through apparatus provided for this purpose. Still another method is a treatment with chemical means, e.g., aqueous alkaline substances, which causes the residual rolling grease to be partially dissolved in the form of soaps, any unsaponifiable components being removed at the same time. Oxidative methods are also known, wherein aluminum objects are treated, e.g., with chromosulfuric acid or salt melts.

In a still further method, the aluminum surface is freed from greasy impurities by mechanical treatment, e.g., brushing or grinding. This method is employed, e.g., for delustering aluminum strips and foils. It cleans the aluminum surface very thoroughly and it is, therefore, also used for cleaning aluminum strips or foils which are to be used in lithography for the preparation of printing plates. Here, the requirements with regard to the purity of the surfaces are very high even for low-grade printing plates; for printing plates of very good quality they are extremely high. Further, the aluminum must be in a hard, rolled condition. Although the mechanical abrasion of aluminum surfaces by brushing, grinding or scraping yields surfaces of very high purity, it can not be relied upon to satisfy very high requirements; for reasons which are still partially unexplained, the results obtained vary

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and the aluminum surfaces are seldom completely free from traces of grease.

Thus, none of the known methods are without disadvantages when a complete absence of grease and a hard rolled condition of the material are required. Part of the free fatty acids contained in the rolling grease is anchored to the aluminum surfaces in the form of soaps. Thus, by extraction with solvents, e.g., only the excess overlying the monomolecular soap layer can be removed. In all degreasing methods in which aqueous media are used, the detached impurities collect on the surface of the bath (provided they are lighter than water), and it is therefore very difficult, and for practical purposes impossible, to remove strips and single sheets from the bath in such a manner that they draw no impurities with them.

The present invention provides a process for degreasing sheetlike rolled aluminum products which results in a more satisfactory degreasing than the methods hitherto used. The process of the present invention includes the known cleaning of aluminum surfaces by mechanical means and removal of the detached particles by blowing with air, but it is performed in a novel manner. It has been found that a noticeably better degreasing is achieved by adding water vapor to the air supplied during the mechanical degreasing process, e.g., by brushing or grinding, or by blowing with water vapor instead of air.

Any increase in the water vapor content of the air blown in becomes apparent in an improved removal of greasy impurities. Even at a water vapor concentration of not more than 60 percent relative humidity, surfaces are obtained in many cases which are free from grease to such a degree that they satisfy even the very high requirements of lithography.

So far, it is not known under which circumstances a water vapor concentration of only 60 percent relative humidity or a little above this value yields optimum results, and under which circumstances it does not. Therefore, in order to ensure the best results are obtained in each case, it is advisable to increase the water vapor content of the air to a relative humidity of at least 80 percent. To prevent unnecessary waste of water vapor and to avoid the annoyances connected with working in very humid air, such as precipitation of condensed water during slight cooling and the inconveniences caused to the operators in the working room by the high content of atmospheric moisture, it is in general advantageous to increase the water vapor content of the air to a relative humidity of not more than 95 percent.

It is also of advantage to heat the humidified air used for blowing in. Temperatures above 100° C. may be employed.

The effectiveness of the new method becomes apparent when using the aluminum strips degreased by the new process. For instance, if printing plates are prepared therefrom, a successful treatment becomes apparent in a reduction or, optimally, the complete absence of defects in the printing plate, i.e., defects which otherwise would accept printing ink and thus print and which would have to be removed by correction if the printing plate is to yield flawless prints. The degree of purity of the cleaned aluminum strip also can be judged more easily and quickly by first wiping the surface of a sample with a 1/100 molar phosphoric acid solution and then inking it up with a protective ink, as is customary in lithography for newly prepared offset printing plates in order to provide them with a coating which protects the printing image on the offset plate against wear during storage and handling. Another method which also may be used for visualizing traces of grease on aluminum surface was published by H. Heiss and H. Krämer under the title: "Ueber die Anwendung eines Sprühtestes zum Nachweis

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von Fettsäuren" (Spray Test for Detecting Fatty Acids) in the periodical "Fette-Seifen-Anstrichmittel-Die Ernährungsindustrie," volume 58 (1956), pages 87 to 90. By this method, the 500th part of one millionth of a gram of fatty acid per square centimeter of aluminum surface can be detected with certainty.

The invention will be further illustrated by reference to the following specific example.

EXAMPLE

A cold-rolled aluminum strip was washed with gasoline, so that the greater part of the grease adhering thereto from the rolling process was removed. Thereafter, the strip was cleaned by brushing it in an atmosphere of 50 percent relative humidity with the dust brushed off being removed by blowing with air. A sample of the cleaned strip was inked up with protective ink. Numerous spots colored by the protective ink became visible on the sample sheet. They indicated the presence of an equal number of grease spots.

Another strip, cleaned with gasoline, was brushed in the manner stated above, except that sufficient water vapor was added to the air blown in that its relative humidity increased to 90 percent. A sample examined in the same manner as described above proved to be completely free from spots.

Brushing of strips was continued while stepwise reducing the quantity of water vapor added by 10 percent per step and taking several samples from each step. It proved that even with air having a water vapor content corresponding to a relative humidity of only 70 percent, only very few defects become apparent. At a relative humidity of 60 percent, the defects were so numerous that the strip was no longer suitable for the preparation of faultless printing plates. However, even in this case, the improvement over a strip prepared by blowing with atmos-

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pheric air (50 percent relative humidity) was considerable, because the number and size of the defects was considerably lower than in a plate prepared by blowing with normal air.

At an intermediate stage of the test, blowing in was performed with air humidified to a relative humidity of 65 percent. A sample taken during this test showed only a small number of defects, but more than a sample taken from a strip treated with air of 70 percent relative humidity.

It will be obvious to those skilled in the art that many modifications may be made within the scope of the present invention without departing from the spirit thereof, and the invention includes all such modifications.

What is claimed is:

1. A process for degreasing a rolled aluminum product which comprises mechanically removing grease from the surface of the aluminum and blowing a stream of air having a relative humidity of at least 60 percent onto the surface.

2. A process according to claim 1 in which the stream of air is heated.

3. A process according to claim 1 in which the relative humidity of the air is in the range of about 80 to 95 percent.

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