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OFFSET PRINTING PLATE

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The present invention relates to an aluminum printing plate, and more particularly, the present invention is concerned with an offset printing plate formed of a certain aluminum alloy, and with a method of printing utilizing such printing plates.

The printing plate of the present invention is particularly suitable for multicolor offset printing.

It has been proposed to use for monocolor offset printing a printing plate which contains about 99% aluminum. However, this type of printing plate cannot be used for multicolor printing. The lines and contours of the individual images blurr and become indistinct and the plate tends to tear upon readjustment. An aluminum alloy containing between 1 and 2% manganese shows similar disadvantages and does not possess the desired high stretching ability coupled with little resiliency or tendency to return to its previous prestretched dimensions.

It is very important that an offset printing plate may be subjected to a high degree of stretching and possesses little resiliency or tendency to return after stretching to its previous dimensions, particularly for multicolor offset printing, since the plates are subjected to stretching in order to adjust dimensional differences between the plates and the paper which is to be imprinted.

It is therefore an object of the present invention to overcome the above discussed difficulties and disadvantages.

It is a further object of the present invention to provide an offset printing plate which may be subjected to a very high degree of stretching, and which has a relatively low yield point or elastic limit so that upon stretching the plate will retain its stretched dimensions and will have little or no tendency to return to its pre-stretched shape.

Other objects and advantages of the present invention will become apparent from a further reading of the description and of the appended claims.

With the above and other objects in view, the present invention contemplates an offset printing plate formed of an aluminum alloy consisting of between 0.7% and 1.3% magnesium, between 0.7% and 1.3% silicon, between 0.4% and 1.0% manganese, up to 0.1% copper, the balance being aluminum.

The present invention also encompasses in an offset printing process the step of forming a transferable image on an aluminum alloy plate having the following composition: between 0.7% and 1.3% magnesium, between 0.7% and 1.3% silicon, between 0.4% and 1.0% manganese, up to 0.1% copper, the balance being aluminum.

According to the present invention, it has been found that a plate carrying an image for offset reproduction and formed of an aluminum alloy of the composition described below will possess the desired qualities i.e., can be subjected to a very high degree of stretching, and will have a relatively low yield point or elastic limit. Such plate according to the present invention consists of an aluminum alloy containing between 0.7% and 1.3% magnesium, between 0.7% and 1.3% silicon, between 0.4% and 1.0% manganese and up to 0.1% copper, the balance being aluminum which may contain the conventional impurities of virgin aluminum. The alloy may be completely free of copper. The term aluminum when not otherwise modified is intended in the present specification and claims

to denote aluminum which may contain conventional impurities.

Preferably the magnesium content of alloy will be about 1%, the silicon content about 1% and the manganese content about 0.8%.

Offset printing plates produced of such alloy are excellently suitable, particularly for multicolor printing. It has been found that plates of the above described alloy compositions can be made in reproducible quality, particularly with respect to stability and shape retention.

Such shape retention is important since, upon being stored, the offset printing plates must retain their shape without buckling, even if the plates are stored in an upright position. This is accomplished with plates of the above-described alloy composition even if the plates are delivered from the producer in soft condition.

It is a further advantage of offset printing plates made of the above described alloy that the same can be stretched to a very high degree and that they remain permanently in such elongated or extended condition. These plates possess not only a very high extensibility of up to about 20 to 25% but also in connection therewith, a relatively very low elastic limit of only between about 7 and 8 kp./mm.^{2}. The term "kp./mm.^{2}" denotes force per square millimeter. This term is used in preference to "kg./mm.^{2}," since "kg." is dependent on and varies with variations in the gravitational force. One kp./mm.^{2} equals 1422.33 lb./sq. inch. Thus, the plates possess very little resiliency and this is of decisive importance in offset printing in order to obtain proper registry and accurate contours. It is particularly surprising that plates of the above described alloy possess such high extensibility and at the same time very great dimensional stability. Usually, these two qualities are not found to such a high degree in one and the same aluminum alloy.

By way of example, a square plate of 1,000 x 1,000 x 0.5 mm. formed of the above described alloy, namely an aluminum alloy containing about 1% magnesium, 1% silicon and 0.8% manganese, and weighing 1.35 kg. is stretched by between about 3 and 5 mm. along its length and width, so that these dimensions are extended by about 0.3 to 0.5%. This degree of stretching corresponds to the normal requirement of offset printing, or particularly multicolor offset printing. The thus stretched plate retains its stretched shape, and no resilient return towards the original unstretched shape and dimensions of the plate could be observed.

The printing plates are worked up at the print shop in various manners. Generally a pre-treatment is carried out which comprises etching, galvanizing or anodizing of the plate. Particularly, in the last case, i.e., when an oxide layer is formed on the plate by anodizing, it is very important that the anodically oxidized surface is free of tear lines. This requirement can be met to a particularly high degree in connection with plates formed of the above-described alloy by coating preferably both faces of the plate with a pure aluminum layer, consisting of aluminum which preferably will possess a purity of between 99.5 and 99.8%. The thickness of each of the plating layers should be kept at between 2% and 15% of the thickness of the aluminum alloy plate and preferably at about 8% of such thickness. It has been found that with thus plated plates the formation of tear lines upon anodic oxidation is avoided and this is of great importance for the quality of the prints which are to be made from such plate. The alloys which were used up to now for forming aluminum printing plates were such that the formation of tear lines could not be reliably prevented and thus the printability of the plates was frequently impaired. Surprisingly, the extensibility or stretching ability of the plate is improved by plating the pure aluminum layers thereon.

It is a further advantage of offset printing plates composed of the above described alloy, with or without a plated layer of pure aluminum thereon, that due to the low weight of the plate, the same can be handled very easily and large quantities thereof may be stored in a relatively small space.

Due to the low weight of the plate, even such compact storage of the same will generally not expose the warehouse or print shop floor to an excessive load.

The aluminum which forms the balance of the above described alloy may contain conventional impurities including, for instance, 0.1% or up to 0.3% zinc. The iron content of the alloy may be up to 0.5%, however the iron content varies greatly depending on the quality of the aluminum such as virgin aluminum which may be used for forming the alloy of which the plate of the present invention is produced. Such virgin aluminum usually has a purity of about 99% and, for instance, the virgin aluminum which is known under the trade name "Erftal" contains only a relatively low iron content of about 0.040%.

The plated layers of pure aluminum are generally applied in conventional manner by rolling.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of printing plates differing from the types described above.

While the invention has been illustrated and described as embodied in an offset printing plate for multicolor printing, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A offset printing plate carrying an ink receptive image adapted to be reproduced by offset printing, said offset printing plate consisting of an aluminum alloy in soft condition and composed of between about 0.7% and 1.3% magnesium, between about 0.7% and 1.3% silicon, between about 0.4% and 1.0% manganese, up to about 0.1% copper, the balance being aluminum, said offset printing plate being stretchable and substantially retaining after stretching its stretched shape.

2. An offset printing plate carrying an ink receptive image adapted to be reproduced by offset printing, said offset printing plate comprising an aluminum alloy plate having opposite faces and consisting of an aluminum alloy in soft condition composed of between about 0.7% and 1.3% magnesium, between about 0.7% and 1.3% silicon, between about 0.4% and 1.0% manganese, up to about 0.1% copper, the balance being aluminum; and a layer consisting of substantially pure aluminum and having a thickness equal to between about 2% and 15% of the predetermined thickness of said aluminum alloy plate covering and firmly adhering to at least one of said opposite faces of said aluminum alloy plate.

3. An offset printing plate carrying an ink receptive image adapted to be reproduced by offset printing, said offset printing plate comprising an aluminum alloy plate having opposite faces and consisting of an aluminum alloy in soft condition composed of between about 0.7% and 1.3% magnesium, between about 0.7% and 1.3% silicon, between about 0.4% and 1.0% manganese, up to about 0.1% copper, the balance being aluminum; and two layers of substantially pure aluminum covering and firmly adhering to said opposite faces respectively of said aluminum alloy plate.

References Cited by the Examiner

UNITED STATES PATENTS

2,181,111	11/1939	Horn	101—149.2
2,240,732	5/1941	Wood	101—149.2
2,695,253	11/1954	Schaaber	75—147

FOREIGN PATENTS

913,591	12/1962	Great Britain.

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