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FLUORINE CONTAINING LAYER ON LIGHT METALS

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3 Claims. (Cl. 204—19)

This invention relates to the manufacture of fluorine containing layers on light metals or alloys thereof by means of electrolysis.

It is known to prepare layers containing fluorine on light metals or alloys thereof by an electrolytic process by arranging the light metal or alloy thereof as the anode and choosing as an electrolyte the melt of a salt or the melt of a fluorine compound.

In accordance with the present invention fluorine containing layers are prepared on light metals or alloys thereof, such as magnesium, the alloy thereof known under the trade-mark "Elektron", by electrolysis using as an electrolyte a poly-acid fluoride having the composition $YF.x(HF)$, wherein x is at least 2 and YF stands for a member of the group consisting of the alkali metal fluorides, ammonium fluoride, amido fluorides and amino fluorides. Besides the alkali metal poly-acid fluorides and ammonium poly-acid fluorides, there may be used the poly-acid fluorides of amides or amines, such as of urea, acetamide, aniline, methylamine, ethylamine, diphenylamine, diethylamine, tetramethyl-ammonium hydroxide and the like. Mixtures of the above mentioned poly-acid fluorides may be employed as well as mixtures of the same with neutral fluorides or bifluorides. The poly-acid fluorides used in accordance with the present invention are characterized by having a comparatively low melting point, so that the process can be performed at low temperatures and with slight consumption of energy, due to which fact the process can also be applied to such metals or alloys with a comparatively low melting point.

As suitable poly-acid fluorides there may be mentioned by way of example the potassium poly-acid fluorides of the composition KF.2HF to KF.4HF, the melting points of the said poly-acid fluorides being between 60 and 70° C.; furthermore, ammonium poly-acid fluorides of the composition $NH_4F.2HF$ to $NH_4F.5HF$, melting between about 20 and 30° C.; further a mixture of poly-acid fluorides of the composition

$$2KF.5HF+NH_4F.HF$$

in various proportions, for example in the ratio 1:1; or a mixture of 80% of $NH_4F.2HF$ and 20% of $NH_4F.HF$, the latter mixture melting at 20° C.

The invention is further illustrated by the following examples without being restricted thereto:—

Example 1.—A magnesium sheet is placed into a melt of $NH_4F.2HF$ and used as the anode. At 40–50° C. an electric current which is regulated by means of a regulating resistance to 1 ampere per square decimeter is passed through for about 5 minutes. Thereby the tension rises from about 50 to about 135 volts. In this manner a fluorine containing layer is produced on the magnesium sheet.

Example 2.—In the same manner a fluorine containing layer is produced on a plate of "Elektron" metal. The "Elektron" plate is used as the anode. As the electrolyte the salt of $2KF.5HF$ is used and a current of ½ ampere per square decimeter is passed through for about 10 minutes at 80–90° C. The final tension is about 56 volts.

Example 3.—In an analogous manner a fluorine containing layer is produced on a magnesium plate while working with a mixture of $KF.2.5HF+NH_4F.HF$ in the proportion 1:1 and passing through a current of 1 ampere per square decimeter for 10 minutes at 100° C. The tension during the process rises to 58–62 volts.

I claim:—

1. A process of forming a protective fluorine containing layer on articles made of a metal of the group consisting of magnesium and magnesium base alloys, which comprises subjecting a fused electrolyte, comprising at least one poly-acid fluoride having the composition $YF.x(HF)$, wherein x is at least 2 and not more than 5 and YF stands for a member of the group consisting of the alkali metal fluorides, ammonium fluorides, amido fluorides and amino fluorides, to electrolysis while employing such metal article as the anode.

2. A process of forming a protective fluorine containing layer on articles made of a metal of the group consisting of magnesium and magnesium base alloys, which comprises subjecting a fused electrolyte, comprising at least one poly-acid fluoride having the composition $YF.x(HF)$, wherein x is at least 2 and not more than 5 and YF stands for a member of the group consisting of the alkali metal fluorides, ammonium fluorides, amido fluorides and amino fluorides, and at least one fluoride of the group consisting of neutral fluorides and bifluorides, to electrolysis while employing such metal article as the anode.

3. A process of forming a protective fluorine containing layer on articles made of a metal of the group consisting of magnesium and magnesium base alloys, which comprises subjecting a fused electrolyte having a melting point not exceeding about 100° C. and substantially consisting of at least one poly-acid fluoride having the composition $YF.x(HF)$, wherein x is at least 2 and not more than 5 and YF stands for a member of the group consisting of the alkali metal fluorides, ammonium fluorides, amido fluorides and amino fluorides, to electrolysis while employing such metal article as the anode.

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