ABSTRACT: An improved stripping process for removing as produced aluminate coatings and exposed aluminate coatings from cobalt base and nickel base superalloys, using ¼ to 5 percent of hydrofluoride acid or an acid fluoride having at least one mole of hydrofluoride acid, 3 to 20 percent of nitric acid and water, permissibly including a low foaming or nonfoaming wetting agent. The temperature of treatment is 50° to 115° F., preferably 60° to 100° F. for a time of at least 15 minutes. The treating solution can incorporate a thickening agent and a solubilizing agent for the thickening agent so as to produce a paste, and the paste can be applied locally for selective stripping.
Fig. 1.

% Cr IN Ni OR Co BASE
SUPER ALLOY VS WEIGHT LOSS

LOSS IN WEIGHT IN mg/sq.cm.

WEIGHT % Cr

INVENTOR
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ATTORNEYS
Fig. 2.

TEMPERATURE OF STRIPPING BATH
VS WEIGHT LOSS

LOSS IN WEIGHT IN mg/sq.cm.

TEMPERATURE °F.

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3,622,391

PROCESS OF STRIPPING ALUMINIDE COATING FROM COBALT AND NICKEL BASE ALLOYS

DISCLOSURE OF INVENTION

The present invention relates to an improvement in the process of stripping aluminide coatings on cobalt and nickel base superalloys as described in my copending application Ser. No. 594,757, filed Nov. 16, 1966, for Process of Removing Coatings from Nickel and Cobalt Base Refractory Alloys now U.S. Pat. No. 3,458,353, granted July 29, 1969. In this prior invention I have disclosed a process for removal of aluminide or chromium aluminum diffusion coatings from cobalt and nickel base superalloys containing at least 18 percent of chromium by weight.

The great bulk of the superalloys currently used for parts of gas turbine engines, such as turbine nozzles, stator vanes, buckets, combustion cans, turbine disks and other components, hereinafter referred to as "hardware," are made from superalloys having a cobalt or nickel base or a cobalt-nickel base, with chromium contents which may be as high as 27 percent by weight, but which in some alloys diminish to as little as 3 percent, or even to 0 percent of chromium. In modern gas turbines operating at much higher temperatures, it is essential to have a protective coating to combat oxidation and hot corrosion. Aluminide coatings have been found to be very successful and are widely used. It will be recognized, however, that by the time the coating is to be stripped, due to oxidation and corrosion in the turbine, it may consist of a substantial part of oxides and other corrosion products of metals with some residual aluminide. It will also be evident that the coatings with which the present invention deals, may include, besides aluminum, chromium, titanium, silicon, iron and other secondary components.

The aluminide coatings are applied by a variety of techniques, including pack cementation, slurry applications, hot dipping, chemical vapor deposition, from fused salts, by physical vapor deposition sometimes under vacuum, and by electroplating.

It will also be evident that without any attempt to describe all of the phases which may be present, the aluminide coatings often include intermetallic phases such as NiAl, Ni3Al, Ni3AI, CoAI, a Co solid solution of aluminum in cobalt, CoAl3 and various higher aluminum intermetallics with cobalt and various secondary elements which may be present in solid solutions, as precipitates, intermetallics or carbides in one or more layers of diffusion coatings.

As an example of some of the commonly employed cobalt base and nickel base superalloys which are now employed, the following may be listed, in percent by weight:

<table>
<thead>
<tr>
<th>Alloy</th>
<th>C</th>
<th>Cr</th>
<th>Ni</th>
<th>Co</th>
<th>Mo</th>
<th>W</th>
<th>Nb</th>
<th>Ti</th>
<th>Al</th>
<th>Fe</th>
<th>B</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>NASA Co-W-Ref</td>
<td>0.60</td>
<td>2.60</td>
<td>(1)</td>
<td>25</td>
<td>1.0</td>
<td>6.0</td>
<td>6.0</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ta-2A</td>
<td>0.12</td>
<td>6.0</td>
<td>(1)</td>
<td>4.0</td>
<td>4.0</td>
<td>6.0</td>
<td>6.0</td>
<td>2.0</td>
<td></td>
<td>2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-1900 (PWA 690)</td>
<td>0.11</td>
<td>8.0</td>
<td>(1)</td>
<td>16.0</td>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
<td>1.0</td>
<td>0.18</td>
<td>4.3</td>
<td>2.5</td>
<td>V</td>
</tr>
<tr>
<td>19-M-300 (PWA 650)</td>
<td>0.15</td>
<td>9.0</td>
<td>(1)</td>
<td>18.0</td>
<td>4.0</td>
<td>4.0</td>
<td>4.0</td>
<td>6.0</td>
<td>0.15</td>
<td>0.43</td>
<td>0.75</td>
<td>Zr</td>
</tr>
<tr>
<td>19-M-300 (PWA 650)</td>
<td>0.17</td>
<td>10.0</td>
<td>(1)</td>
<td>18.0</td>
<td>4.0</td>
<td>4.0</td>
<td>4.0</td>
<td>6.0</td>
<td>0.15</td>
<td>0.43</td>
<td>0.75</td>
<td>Zr</td>
</tr>
<tr>
<td>19-M-300 (PWA 650)</td>
<td>0.08</td>
<td>12.0</td>
<td>(1)</td>
<td>16.0</td>
<td>6.5</td>
<td>1.5</td>
<td>0.5</td>
<td>2.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.25</td>
<td>Cu</td>
</tr>
<tr>
<td>T9-15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Udiment 709</td>
<td>0.15</td>
<td>16.0</td>
<td>(1)</td>
<td>18.0</td>
<td>5.0</td>
<td>3.2</td>
<td>4.3</td>
<td>0.03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Udiment 649</td>
<td>0.08</td>
<td>18.0</td>
<td>(1)</td>
<td>18.0</td>
<td>4.0</td>
<td>2.9</td>
<td>2.9</td>
<td>0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WT-62 (PWA 693)</td>
<td>0.42</td>
<td>21.0</td>
<td>(1)</td>
<td>18.0</td>
<td>4.0</td>
<td>2.0</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hastelloy-X</td>
<td>0.20</td>
<td>22.0</td>
<td>(1)</td>
<td>18.0</td>
<td>4.0</td>
<td>2.0</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hastelloy-X</td>
<td>0.20</td>
<td>22.0</td>
<td>(1)</td>
<td>18.0</td>
<td>4.0</td>
<td>2.0</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X-40</td>
<td>0.20</td>
<td>22.0</td>
<td>(1)</td>
<td>18.0</td>
<td>4.0</td>
<td>2.0</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stellite 21</td>
<td>0.20</td>
<td>22.0</td>
<td>(1)</td>
<td>18.0</td>
<td>4.0</td>
<td>2.0</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stellite 21</td>
<td>0.20</td>
<td>22.0</td>
<td>(1)</td>
<td>18.0</td>
<td>4.0</td>
<td>2.0</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-46</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

In the nickel base superalloys higher strengths have been achieved particularly at the expense of oxidation resistance. The superalloys containing high contents of chromium are losing popularity because of the desire to gain increased strength at higher temperatures at the expense of lower oxidation resistance. The superalloys, therefore, which contain lower contents of chromium are extensively protected with aluminide coatings and this is of paramount importance.

The problem with which the present invention is particularly concerned is the difficult problem of stripping these coatings without objectionable attack on the base alloy. Any substantial intergranular corrosion of the base alloy during the stripping operation is likely to be a cause for rejection. While the invention is believed to find its widest application on hardware which has undergone a campaign in a gas turbine and been removed for straightening, rewelding and recoating, it also is believed to have wide application in coated hardware which has been rejected because of defects in the coating, and which it is desired later to recoat.

In my prior patent application above referred to, it is pointed out that attack on superalloys having cobalt or nickel bases will be encountered when the content of chromium is less than a certain amount, which I have now established to be in the range from 15 to 18 percent. A weight loss of base alloy during stripping of more than 4 mg./sq. cm. is considered to be excessive. The rate of attack on the base alloy may be determined by putting the virgin uncoated superalloy through the recommended procedure. By the graph shown in my prior patent application, it will be noted that only those of the cobalt and nickel base alloys containing greater than about 15 percent chromium and preferably greater than 18 percent chromium, can be safely treated with the stripping process there proposed, thus avoiding unacceptable attack.

As a result of further research, I have discovered that the base alloy can be protected by a stripping solution used under conditions which no longer cause the coating to peel or "pop off" as in the process of my prior patent application. Through a modification of the treating conditions, I have discovered that the coating can be gradually reacted upon so that it will be readily removed later as an explosive burning, but will remain intact on the surface and act as a limiting and protecting layer prior to removal.

Also under the process of the present invention, even if the coating were to peel, the treating solution under the new conditions would no longer create objectionable attack on the superalloys.

The stripping process of the present invention very effectively removed aluminide coatings from cobalt base, nickel base and cobalt-nickel base superalloys containing chromium content from 0 percent chromium to 27 percent by weight and higher. I have discovered that an aqueous solution containing hydrofluoric acid and nitric acid at ambient temperature in the range between 50° and 115° F., and preferably between 60° and 100° F., of the proper composition, causes little or no attack on the superalloys. The stripping solution according to the invention contains between one-half and 5 percent HF by weight and between 30 and 20 percent of nitric acid by weight.

The treatment of the coated superalloy part in the stripping solution should last for at least 15 minutes and preferably for at least 1 hour. Compared with the action of the stripping solution described in my prior patent application, the stripping solution of the present invention at the temperatures and acting for the times above mentioned, behaves very differently. The stripping solution as described in the prior application caused the coating to peel pop "pop off," as well as disintegrate. Under the treatment in the present invention, the
stripping solution slowly and thoroughly reacts with the aluminum coating, causing the coating to change its chemical composition, and making it easy to remove by an abrasive blast in a subsequent operation, but it does not cause the coating to peel or "pop off" in the stripping solution.

After the treatment with the stripping solution, the subsequent rinsing, drying, and finally the dry blasting operation with an abrasive such as sand, powdered aluminum, or glass, suitably at an air pressure of 5 to 100 p.s.i., completely removes the diffusion coating in a matter of seconds. It is then found that the base metal has not been subjected to attack.

Thus, whereas the treatment of my prior patent application which caused the aluminum coating to peel or pop off in the stripping solution, was very likely to attack and etch superalloys of lower chromium content, the process of the present invention can be used on superalloys having cobalt or nickel or cobalt-nickel bases even though there is no chromium content at all.

It is important in the present invention to avoid concentrations of hydrogen fluoride greater than about 5 percent by weight because they actually impair stripping of the aluminum coating, probably because the fluoride ion tends to passivate it.

Since hydrogen fluoride may be an objectionable chemical to employ, it will in many cases be preferable to use from one-half to 5 percent by weight of an acid fluoride or bifluoride of the type which has at least 1 mole of free hydrofluoric acid in the molecule. Any one of a variety of bifluorides or acid fluorides may be used, but I prefer to employ those of an alkali metal or alkali metal radical, such as ammonium bifluoride, sodium bifluoride, or potassium bifluoride. Any bifluoride used should be readily soluble in water so as to make the mole of hydrofluoric acid readily available. The fact that nitric acid is also incorporated in the stripping bath insures the unusual reactivity of the bath and more effective ionization or hydrolysis of the fluoride to provide free hydrofluoric acid in the solution.

Certain expedients can be employed to promote more effective stripping. One is to agitate the stripping solution itself, be it mechanical or fluid stirring, or by blowing air or other suitable gas into the stripping solution. Further assistance in stripping can be obtained by agitating or vibrating the hardware being subjected to the stripping solution, and either supersonic or subsonic vibration will assist in this connection.

Promotion of wettability of the hardware by the treating solution is desirable, and for this purpose a low foaming or nonfoaming wetting agent stable in strong acid solution is helpful to promote wettability. The quantity of wetting agent can be very small, generally in the range from 0.01 percent to 0.5 percent by weight. Examples of suitable wetting agents are as follows:

a. Ethylene oxide condensates
b. Ethoxylates of linear primary alcohols.

The most desirable fully liquid solution according to the present invention is as follows:

- Ammonium bifluoride 1.5% by weight
- Nitric acid 8.0%
- Wetting agent 0.05%
- Water balance

In carrying out the invention, a very desirable sequence of process steps is as follows:

1. Degrease if necessary. Either vapor or alkaline degreasing may be used.
2. Abrasive blast, suitably using 090 or 0100 grit aluminum oxide at an air pressure of about 60 p.s.i. Usually 30 seconds blasting is sufficient.
3. Blow off excess grit with air.
4. Immure in the stripping solution at room temperature as explained above and hold the parts thus immersed for a time of at least 15 minutes and preferably an hour. The most desirable temperature is about 75°F. Agitation of the solution and agitation of the parts is preferred.

5. Remove the parts from the stripping solution and rinse in clean water.
6. Neutralize the parts in a weak alkali solution, for example 2 to 6 ounces per gallon of caustic soda or sodium carbonate at room temperature.
7. Remove the parts from the alkali solution and rinse in clean water.
8. Dry in air.
9. Grit blast to remove reaction products.
10. If necessary, the above cycle can be repeated. After the above process is completed, the parts are ready to put in a cementation pack for further aluminizing or chrom-aluminizing or subjected to diffusion treatment.

An alternate procedure for stripping coatings from superalloy parts is as follows:

1. Degreasing the superalloy parts.
2. Blasting the parts with abrasive.
3. Treating the parts with the stripping agent.
4. Rinsing the parts in water.
5. Neutralizing the parts with an alkali solution.
6. Rinsing the parts in water.
7. Drying the parts.
8. Blasting the parts with abrasive.
9. Stripping the parts in the stripping agent for at least 15 minutes.
10. Reblasting the parts with abrasive.
11. Rinsing the parts in water.
12. Neutralizing with alkali.
13. Rinsing in water.
14. Drying the parts.
15. Blasting the parts with abrasive.

In FIG. 1 is shown two curves plotting loss in weight of the base metal in mg./sq.cm. as ordinate against chromium content in the superalloys as abscissa. These curves show the effect on various cobalt and nickel base superalloys above mentioned when treated with the following stripping solution:

- HNO₃ 7%
- H₂SO₄ 8%
- H₂O 90%

Curve A was obtained treating for 30 minutes at 175°F. according to the recommended procedure of the earlier patent application. Curve B shows the weight loss of the superalloys when treated according to the present invention, i.e. 1 hour at 75°F.

It will be noted that when the chromium content is less than about 15 percent to 18 percent, there is a dramatic decrease in base alloy attack when operating at the low temperatures recommended in the present invention.

FIG. 2 compares loss in weight of base metal in mg./sq.cm. as ordinate with temperature in °F. as abscissa, using the following stripping solution:

- Ammonium bifluoride 1.5%
- Nitric acid 8.0%
- Water 90.5%

Curve A is for pure nickel. Curve B is for superalloy B-1900 containing 8 percent of chromium by weight and curve C is for superalloy W-52 having 21 percent of chromium by weight.

It will be seen that in order for the loss of base alloy to be kept below 4 mg./sq.cm. on superalloy B-1900, it is very important that the temperature be kept lower than about 115°F., for pure nickel it should be lower than 80°F.

Prior to the present invention, the literature has described the use of solutions of hydrofluoric acid and nitric acid always at elevated temperatures greater than 120° or 140°F. for passivation or descaling operations, and as explained, these temperatures are counterindicative in the case of the present invention.

EXAMPLE 1

In example 1 a solution of 1.5 percent by weight of ammonium bifluoride, 8.0 percent by weight of nitric acid, balance
3,622,391

water, was used on various uncoated superalloys and pure nickel as listed below in the table. The exposure at 70°F was for 1 hour.

**EXAMPLE 2**

In example 2 a stripping solution of 1.0 percent of hydrofluoric acid, 8.0 percent nitric acid and balance water, was used to treat the same alloys at 70°F. For 1 hour. The table below shows comparison of weight losses for the various alloys noted.

<table>
<thead>
<tr>
<th></th>
<th>mg./sq. cm. weight loss</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WI-52</td>
<td>B-1900</td>
<td>U-500</td>
</tr>
<tr>
<td>Example 1</td>
<td>0</td>
<td>1.5</td>
<td>0.05</td>
</tr>
<tr>
<td>Example 2</td>
<td>0</td>
<td>1.5</td>
<td>0.04</td>
</tr>
</tbody>
</table>

It will be observed that the weight loss was 0 in the case of WI-52 which contains 21 percent of chromium, and was very low in the case of U-500 which contains 19 percent of chromium, but that the weight loss rose to higher values in the case of B-1900 containing 8 percent of chromium and in the case of U-700 containing 15 percent of chromium and in the case of pure nickel the weight loss is even higher, though still, just within an acceptable range. It will be noted that ammonium bifluoride and hydrofluoric acid act in a similar manner due to the fact that the ammonium bifluoride contains 1 mole of free hydrofluoric acid.

**EXAMPLE 3**

A solution of 1.5 percent by weight of sodium bifluoride, 8.0 percent by weight of nitric acid, balance water, is just as effective as ammonium bifluoride, mentioned in example 1.

**EXAMPLE 4**

A solution using potassium bifluoride instead of ammonium bifluoride is equally effective with the ammonium in example 1.

**EXAMPLE 5**

Hydrofluoric acid is equally effective with ammonium bifluoride as mentioned in example 1, providing that the quantity is calculated on the basis of the HF present in the ammonium bifluoride.

As compared with the subject matter disclosed in my patent application above referred to, there are several important advantages in the present invention.

No external heating is required and there is therefore no danger of overheating if a control fails to function properly.

The apparatus employed to hold the stripping solution can be simplified since a plastic container of polypropylene or polyvinylchloride can be used.

Since the temperature is low, objectionable vapors are not generated and do not have to be exhausted.

The residual coating from the aluminide after treatment with the acid protects the base alloy since the coating does not pop off during exposure to the stripping bath. It will be evident, however, from the table above that even if the base alloy were exposed, the attack would not be objectionable.

In the procedure followed in overhauling a gas turbine engine, once the engine has been disassembled, the various pieces of hardware are examined to see if repair is necessary. It is quite usual to subject many components such as turbine components such as vanes to straightening and welding, after which the parts are reclassified. Where the hardware has been coated, it is likely that the coating will contain oxide and possibly other corrosion products. If the aluminide coating is to be replaced, it is desirable to remove these corrosion products as well as the aluminide coating in order to weld the parts.

In some cases it may be desirable to recoat by simply removing the oxide or other corrosion products, still leaving the residual diffusion coating intact, and in this case the time of treatment can be suitably shortened.

Prior to recoating, the hardware is subjected to the stripping procedure of the present invention, with due attention to rinsing, neutralizing, rinsing, and grit blasting. Where only the corrosion products are to be removed, the blades may be realuminized or rechrom-aluminized after simply removing the oxide and corrosion products. Usually, however, the hardware parts are stripped down to base alloy before the diffusion treatment.

Where welding repair is necessary, as for example on the trailing edges of vanes, the invention presents a very effective means of removing the aluminide coating prior to welding. In some cases, however, it may be desirable to remove the coating locally in order to accomplish welding. One procedure which may be followed is to mask the portions of the hardware which are to be protected by taping, waxing or using organic coatings such as modified alkyds or vinyl paints. Then the part can be placed in the stripping bath at a suitable temperature which preferably should not exceed 100°F. The fact that the stripping solution can be used at room temperature makes this simple masking technique effective since there are no hot vapors which might penetrate the mask.

For stripping in localized areas, a stripping paste according to the present invention may be employed, in which the stripping solution is incorporated with thickening and solubilizing agents which will prevent it from running off the blade. A paste according to the invention may include any of the acid compositions referred to above with the thickening and solubilizing agents, suitably each in the range of one-half to 3 percent by weight. A suitable example of a paste of this character is as follows:

<table>
<thead>
<tr>
<th>Ammonium bifluoride</th>
<th>1.50 by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitric acid</td>
<td>1/2</td>
</tr>
<tr>
<td>Polycrylde E-4000</td>
<td>15</td>
</tr>
<tr>
<td>Gum tragacanth</td>
<td>1/8</td>
</tr>
<tr>
<td>Water</td>
<td>balance</td>
</tr>
</tbody>
</table>

The paste is made by dissolving the ammonium bifluoride in the water, adding the nitric acid and then dissolving the polycrylde E-4000 (this represents molecular weight) in the water. The gum tragacanth is gradually stirred in to develop the desired paste consistency. This is all done at room temperature. The organic components and the decreased ionization slow down the stripping action on the aluminized coating so that it may be necessary to make several different applications. However, where thin coatings are to be removed, this paste can be effectively applied to localized areas. The fact that the treating agent is cold enables the paste to function since at higher temperatures the thickening and solubilizing agents would be aggressively oxidized by the nitric acid and thus destroyed.

Polycrylde E-4000 is a condensation product of ethylene oxide with a molecular weight of 4000. Gum tragacanth consists of a soluble portion known as tragacanth which is a ring organic compound containing 3 moles of glucanic acid and one mole of arabinose with a side chain of 2 molecules of arabinose. The relatively insoluble portion of this molecule is known as bassorin, a complex structure of poly lactate ester acids. Gum arabic and polycrylde of molecular weights between 200 and 12,000 can be used instead of gum tragacanth and polycrylde E-4000 respectively.

Among the diffusion treatments on superalloys which can be effectively stripped according to the present invention are the following: aluminized, chrom-aluminized, codeposited coatings of aluminum and titanium, codeposited coatings of chromium, aluminum and silicon, codeposited coatings of aluminum and iron and codeposited coatings of aluminum, iron and chromium.
In view of my invention and disclosure, variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the process shown, and I therefore, claim all such insofar as they fall within the reasonable spirit and scope of my claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A process of stripping the following coatings: aluminate, corroded aluminide, chromium-aluminum, aluminum-titanium, chromium-aluminum silicon, aluminum-iron and aluminum-iron-chromium from superalloys having a base of the class consisting of cobalt, nickel, and cobalt and nickel, which comprises exposing the coating to treatment with an acidic material consisting essentially of the following: (a) a component of the class, and in the amount, consisting of hydrofluoric acid in the amount of one-half to 5 percent by weight of the acidic material and acid fluorides in an amount such that the free hydrofluoric acid is one-half to 5 percent by weight of the acidic material, (b) 3 to 20 percent by weight of nitric acid, and (c) balance substantially water, at a temperature of between 50° and 115° F. for a time of at least 15 minutes.

2. A process of claim 1, in which the temperature is between 60° and 100° F.

3. A process of claim 1, which comprises agitating the treating agent.

4. A process of claim 1, which comprises agitating the alloy parts being treated.

5. A process of claim 1, in which the compound containing free hydrofluoric acid is a bifluoride of the class consisting of ammonium bifluoride, sodium bifluoride, and potassium bifluoride.

6. A process of claim 1, which comprises incorporating a low foaming or nonfoaming wetting agent in the treating agent.

7. A process of claim 1, which comprises subsequent to stripping rinsing the superalloy parts, drying them and dry blasting with an abrasive.

8. A process of claim 1, which comprises degreasing the superalloy parts, blasting them with an abrasive, treating the parts with the stripping agent, rinsing the parts in water, neutralizing the parts with an alkali solution, rinsing the parts in water, drying the parts, blasting the parts with abrasive, stripping the parts in the stripping agent for at least 15 minutes, reblasting the parts with abrasive, rinsing the parts in water, neutralizing with alkali, rinsing in water, drying the parts and blasting them with abrasive.

9. A process of claim 1, in which the treating agent is in the form of a paste.

10. A process of claim 9, which comprises locally applying the paste to a portion of the surface of the coating in order to selectively strip the coating at that location.

* * * * *
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,622,391 Dated November 23, 1971

Inventor(s) Alfonso L. Baldi

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Columns 1 and 2, Alloy Chart

Under heading "Other" designation "2 Re" should be in line with designation NASA Co-W-Re under heading "Alloy".

Under headings Ni, Co and Fe the "(1)" should be --Bal.-- in each case.

Column 2, line 75, the first "pops" should be --or--.

Column 3, line 67, change "090 or 0100" to --#90 or #100--.

Column 6, line 40, the formulation Nitric acid should be changed from "p%" to --8%--.

Signed and sealed this 2nd day of May 1972.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCALK
Commissioner of Patents