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Early Thermal Spray Application—*JTST* Historical Patent #7*

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COMPLETE SPECIFICATION

IMPROVEMENTS IN OR RELATING TO THE FORMATION AND APPLICATION OF ALLOYS OR MIXTURES OF METALS OR OTHER FUSIBLE MATERIALS

I, REGINALD KEBLE MORCOM, of 8, Victoria Street, in the City and County of Westminster, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:

The present invention relates to the formation and application of alloys or mixtures of metals or other fusible materials, and more especially to the forming, and depositing of metal alloys.

Certain alloys such as lead-copper are very difficult to make by the means heretofore practiced; and it is also very difficult in some cases to deposit alloys of metals.

The present invention has for one of its objects to overcome these difficulties. The invention, however, is not restricted to the alloying of metals and the depositing of metal alloys on surfaces.

It can, for instance, also be used for depositing a metal together with another fusible substance such as glass or it can be employed for producing various combinations of two or more fusible substances whether metallic or non-metallic.

According to the present invention the substances which are to be alloyed or mixed are fed either together or separately in the form of solid non pulverulent bodies to a point or points where they are all or each heated and subjected to the action of a jet or blast. Or, the said substances may be previously melted separately and projected by a jet or jets on to a common point.

In carrying the said invention into practice the said substances may either be fed together to a common point against which the aforesaid jet or blast is directed or they may be fed separately but converge upon such a point, or each of the materials may be fed towards a separate jet or blast, the said materials then being caused or allowed to come together to form the desired combination whether an alloy or mixture.

Where the materials are fed forward together they may be in the form of a pair or bundle of wire-like bodies and they may be either loose or twisted or plaited together. Or, they may be previously melted separately and then passed through a common jet or separate jets by any suitable means for instance by a plunger or injector, and they may with or without further subjection to heat be caused to alloy or mix as desired.

The metal alloys made according to the process hereinbefore described may be obtained in various forms, for instance if it is desired to obtain a dust or powder the spray may be blown or injected or dusted into a suitable preferably cooled receptacle or space, as for instance a box cooled by water, air, or other means, where the alloy in the form of dust collects on the walls or on the bottom.

If it is desired to obtain a granulated alloy, the temperature at the point where the alloy is formed may be so regulated that the molten alloy will fall into a vessel containing water. The alloy may be caused to form bodies of other convenient form capable of subsequent adaptation or manipulation or use.

When using the invention for the purpose of forming deposits or coatings of the alloy or mixture formed by or during the process, the jet or blast (which term also includes jets or blasts) would be directed against the surface upon which the said combination of materials is to be deposited. Said surface may either be cold or may be heated to any temperature that will facilitate the process; and the added metals or any of them are heated to their melting or to a lower and more convenient point.

Where the said materials are fed together in the form of a bundle, twist or plait or the like, or where they are fed separately and converge upon a common point, there would of course be a common point of heating for the substances and a single jet or blast may be directed against that point; but where they are heated each at a separate point they may be acted upon by jets or blasts which converge at the surface that is to receive the deposit.

Where the surface to be coated is of considerable area, or even in cases where it is quite small, the applied materials may be deposited in a comparatively thick layer or coating which may afterwards be rolled either hot or cold to the desired thinness in any well-known way.

Any suitable known means may be employed for feeding forward the materials at the proper rate, and such means may vary considerably; for instance, the whole or a bye-passed or other portion of the air used for the blow-pipe may be employed either directly or indirectly as a means of propulsion, or any suitable rotary or other air engine such as that employed in a pneumatic drill, or turbine, electrical motor, magnetic means, clockwork,

*This series of historical patents concerned with thermal spray technology has been compiled by C.C. Berndt (SUNY at Stony Brook, NY) and K.A. Kowalsky (Flame-Spray Industries, Inc., NY).

or hand operated devices may be used for feeding forward the material; and such feed may be effected either by feeding means engaging directly with the material or by actuating a spool or other carrier therefor. The amount of air can be used to govern the rate of movement, or the rate of material fed.

In any of the above instances, in place of using a blow-pipe flame or the like for heating the materials, or even in conjunction with such a flame, any one or more of said materials may be heated by the passage of an electric current and may if desired form one of the electrodes of an electric arc; for instance to form an alloy of brass one electrode may be copper, the other zinc; and may be acted upon by a blast of suitable intensity and composition.

In some cases, especially where the materials or any of them have a very high melting point or where there would be any inconvenience in applying a melting temperature at the point against which the blast is directed, said materials or material may be heated to a temperature short of the melting point and disintegrated by the jet or blast, which latter would be of the necessary force for this purpose.

The receiving surface may itself form one of the metals or other component substances of the desired alloy and may be heated to a temperature at which it will become alloyed with the added metal, such temperatures being well known for the various metals; and the added metal or metals may either be heated to melting point before or during spraying or may be heated to a temperature short of melting point and disintegrated by the mechanical force of the blast as set forth in the Specification filed with my concurrent Application No. 18,840/13. Preferably the said surface would comprise the metal having the highest melting point of the various metals that are to form the alloy.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I wish it to be understood that I am aware of the Specification of Letters Patent No. 28,001 of 1912 granted to Erika Morf, and I make no claim to anything described or claimed therein, but I declare that what I claim is:

1. The process of forming an alloy or mixture of fusible substances by feeding said substances in the form of solid coherent or non-pulverulent bodies or in a molten state to a point or points where they are all or each heated and subjecting them to the action of a jet or blast.
2. The process of forming an alloy or mixture of fusible substances by projecting said substances from solid non-pulverulent bodies or in molten state by means of a blast against a common surface.
3. A process as set forth in Claim 1 or Claim 2 in which the said solid fusible substances are fed to the blast in the form of a plait, twist, bundle or the like.
4. The process of forming an alloy as set forth in Claim 1 by blowing or injecting the metals that are to form the alloy into a receptacle or space where they are collected in the form of removable dust.
5. The process of making an alloy or the like by means of a jet as set forth in Claim 1 in which the metals from said jet are projected or allowed to fall into water or other suitable liquid so as to form a granulated alloy or the like.
6. The process of making an alloy by spraying or injecting a metal or metals by means of a jet or blast in a solid coherent or non-pulverulent state or in a molten state against a sheet or body of other metal or metals while heating said sheet or body to a temperature at which it will become alloyed with the injected metal or metals.
7. The process of making an alloy by using one or more of the metals that are to form said alloy as one of the electrodes and the other metal or metals as the other electrode of an electric arc and projecting or bringing together said metals by means of a blast.

Dated this 23rd day of February, 1914.

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