Early Thermal Spraying—*JTST* Historical Patent #2*

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(Under International Convention)
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Date of Application (in the United Kingdom), 4th Dec., 1912. At the expiration of twelve months from the date of the first Foreign Application, the provision of section 91 (3) (a) of the Patents and Design Act, 1907, as to inspection of Specification, became operative
Accepted 29th May, 1913

COMPLETE SPECIFICATION

A METHOD OF PRODUCING BODIES AND COATINGS OF GLASS AND OTHER SUBSTANCES.

I, ERIKA MORF, Spinster, of 82 Hardturmstrasse, Zurich, Switzerland, 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:-

For the purpose of coating surfaces with layers of metal and the other fusible substances, it has been proposed to spray the substance in a melted state on to the surface, and also to spray solid particles of the substance through a flame towards the surface, the flame serving to melt the particles in their passage.

The present invention consists in an improvement in these processes, and this improvement consists in using a rod wire or other suitably shaped solid, non-pulverulent body of the coating substance, melting the same at one end or part at the rate at which the coating is performed, and at the same time feeding the said body towards the melting appliance and blowing the melted substance from that end or part on to the surface to be coated.

This improved process may be used for producing coatings of metal, glass or other fusible material, and such coatings may be applied to objects of any kind capable of receiving same. Examples of such objects are ornamental mouldings of wood, artificial stone and the like; also objects of metal, as for example medallions.

In the annexed drawings, Figure I is a diagrammatical view of operation. *a* is a glass rod which is fed forwards uniformly or intermittently in the guide sleeve *b*, the lower end of said rod being melted by a flame *c*. The drops of molten glass rapidly formed in succession thereby are driven with great force by a stream of air, gas or steam from the pipe *d* onto a preferably heated surface *e*, thereby a coating of an amorphous structure is formed on the said surface.

The glass rod may also be melted by means of a blow pipe flame concentrically surrounding such rod, the molten drops of glass being thrown on to the surface by the force of the flame, assisted, if necessary, by likewise concentrically fed compressed air (or vapours of gases); with a readily melting material (soda and oxide of lead gas) and highly compressed and heated air, a more or less fine disintegration of the molten drops of glass is obtained.

Figure 2 shows the operation with a concentrically fed flame, *a* being the glass rod which is moved forward in the pipe *b* at a uniform speed. Between the two pipes *b* and *c* there is a hollow space *d* through which is fed a combustible gas or gas mixture (for example, lighting gas, oxy-hydrogen gas, acetylene); the compressed air required for the disintegration and throwing on operation issues through the hollow space *f*, between pipes *c* and *e*.

It will be obvious that the size, pressure of gas, chemical nature of the flame and composition of the material to be melted are of great importance for obtaining the most favorable effects; it is necessary that the other factors, such as the thickness of the glass rod, the speed at which the rod is fed forwards, the quantity, temperature and pressure of the conveying blast, as well as the distance of the surface to be coated from the blow apparatus, should be in a certain relative ratio, which can be readily ascertained by experiments. The glass may also be melted by electrical means, as for instance with the aid of the device shown in Figure 3, or by directing an arc light by magnetic action towards the end of the glass rod. *a* is the glass rod which is fed downwards in the graphite tube *b* which simultaneously serves as the electrode and guide tube.

The two solid carbon sticks *c* form the negative electrodes, which are arranged in such a manner that only the lowest part of the tube *b* is rendered incandescent and consequently only the lowest part of the glass rod is melted. Instead of melting away the glass rod in the form of a thin rod, the material to be melted may also be fed to the hollow space in the tube *b*, in the form of granules or flexible cables. *d* is the duct for the preferably heated conveying blast. In order to localize as far as possible the heating of the sleeve electrode *b*, the latter is preferably provided with a thick coating of copper reaching to the line *e*; to this end the electrode *b* may also be reduced in cross section at its lower end.

*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).

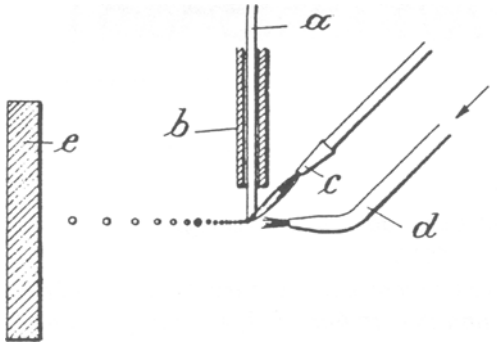
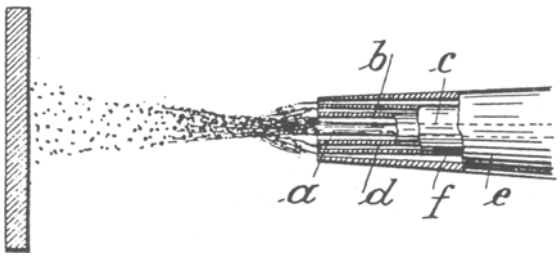


Fig. 1.

Fig. 2.



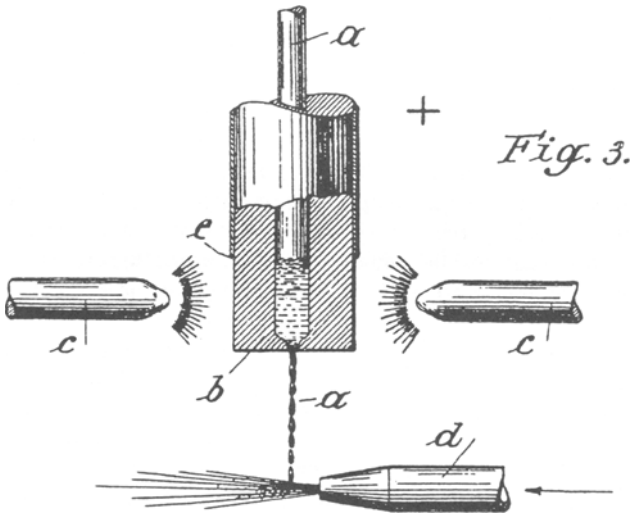


Fig. 3.

Inversely, the material to be melted may be fixed in position and the melting and throwing on device may be movably arranged. The latter may for instance be arranged so that with two nozzles arranged one above the other, a hot blow flame issues from the upper one whilst the lower one effects the throwing on operation.

The coating may be permanently or detachably applied, in the latter case, the coating may be detached and used as an independent or separate article. When using an arrangement according to Figure 1 or 2, a tube may be used in lieu of the solid rod to be melted, such tube containing internally a flux which will increase the fusibility of the material used, or when the metals are used, will have a reducing effect. Another form of the invention consists in making a rod by pressing together powder and a suitable adhesive of flux. In this case the operation of the blast device is confined to heating the already divided material, and imparting to the particles the movement necessary for the production of cohesive coatings, in this case a division or pulverization is not required. It will be obvious that a large number of practical apparatus are feasible, those above only being mentioned as examples. Fusible substances, metals and so forth in the form of rods, tubes, granules, or mixed sets may be treated in the manner above described in lieu of glass.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:-

1. The method of applying to a surface a coating of glass, metal or other fusible substance which consists in feeding a solid, non-pulverulent body of the fusible substance towards a melting appliance at the rate at which the melting takes place, and at the same time blowing the melted substance against the surface.
2. The method of producing detachable coatings by the process set forth in Claim 1, the coatings being subsequently removed from the surface, for separate use.

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