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Early Thermal Spray Application—*JTST* Historical Patent #9*

UNITED STATES PATENT OFFICE
1,978,415
METHOD OF UNITING METALS
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2 Claims. (Cl.91—70.2)

The object of this invention is to provide a new method of uniting metals, and particularly relates to an improvement or modification of the method described and claimed in an application for patent by Albert W. Morris filed Nov. 21, 1931, Serial No. 576,620.

The method described and claimed in said application for patent has particular reference to impregnating the surface of a ferrous article to a suitable depth with a metal or alloy having an affinity for nitrogen. The specific way this impregnating is obtained in the method described in said application is by immersing the ferrous article while hot in a bath of molten metal having an affinity for nitrogen.

I have found that the broad method above described can be carried out by coating the metal piece with a spray of molten metal having a relatively lower melting point than the metal piece, the metal piece being kept at a temperature above the melting point of the sprayed material during the operation.

The specific method can be practiced by impregnating the surface of a ferrous casting or forging by coating the same with a spray of molten metal or alloy having an affinity for nitrogen, the casting or forging being kept at a temperature above that of the melting point of the sprayed material during the operation. Preferably the heat used in making the casting or forging is employed as far as possible to maintain the piece to be treated at the temperature specified.

Many forms of apparatus can be devised for carrying out my improved method, and one simple apparatus is illustrated in the accompanying drawing, in which:—

Fig. 1 is an end elevation of enough of an apparatus to illustrate how the method may be practiced, and

Fig. 2 is a plan view thereof.

Referring to the drawing and in detail, A—A designate spraying nozzles such as are usually employed in hot spraying. These nozzles may be arranged on a screw B so that they may travel back and forth by rotating the screw alternately in different directions. C—C designate centers on which the forging or casting F to be treated can be held. One of these centers preferably is provided with flutes or grooves so that by rotating the same, the piece F is rotated so that its entire surface can be sprayed.

If desired a number of gas jets can be arranged to maintain the piece F at the desired temperature.

In operation, the piece F is taken as hot as possible after it has been shaped by the forging or casting process, and placed on the centers and rotated, and sprayed by the nozzles.

If the article is to be prepared for the nitriding process, the same is made of iron or steel, or of any suitable ferrous alloy, and the spray is formed of a molten metal having an affinity for nitrogen. This molten metal usually is aluminum or some aluminum alloy, known in the art as susceptible of hardening by being subjected to free nitrogen.

By spraying in this manner, there will be a considerable penetration of the spray into the surface of the article treated so that when the same is nitrided a hard shell will be formed thereon.

The method can be practiced with other metals. For instance, a rust resisting compound may be sprayed on a hot piece or a babbitting alloy or bearing material may be sprayed on a hot shaft or journal. Thus the method may be applied to many different purposes.

Many other forms of apparatus may be devised by a skilled mechanic for practicing my improved method without departing from the scope of the invention as specified in the claims.

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

1. The method of making a ferrous, cast or forged piece nitridable, which consists in taking the piece as hot as possible after casting or forging, and coating and impregnating the surface thereof with a spray of a molten metal or alloy having an affinity for nitrogen, the temperature of the piece being above the melting point of the sprayed material during the operation.

2. The method of making a ferrous, cast or forged piece nitridable, which consists in taking the piece as hot as possible after casting or forging, and coating and impregnating the surface thereof with a spray of a molten aluminum or aluminum alloy, and maintaining the temperature of the piece above the melting point of the sprayed material during the operation.

John M. Collins

*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).

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Fig. 1.

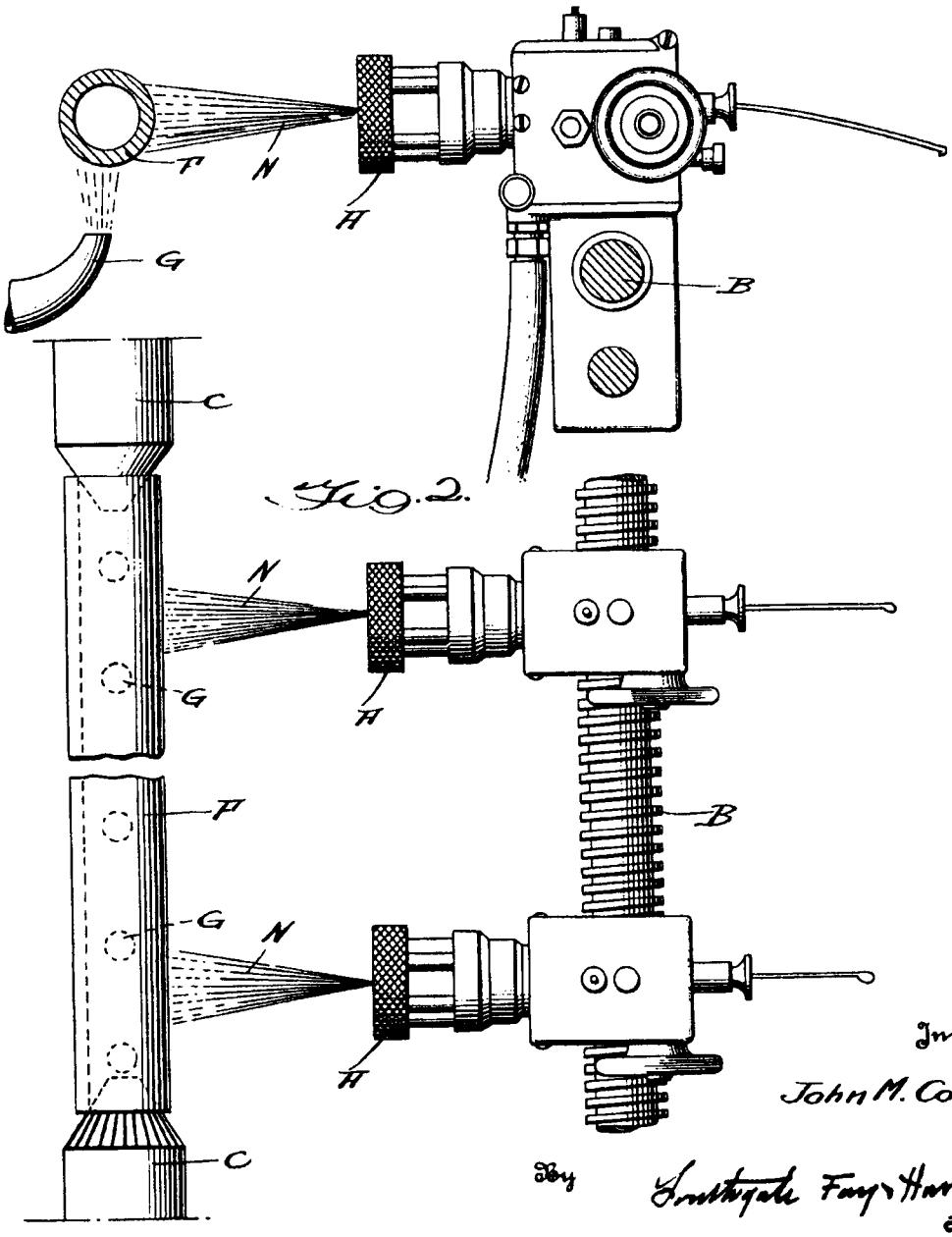

Fig. 2.

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