Patented Oct. 22, 1940 2,218,781

UNITED STATES PATENT OFFICE

2,218,781

METHOD OF CASTING ONE METAL UPON ANOTHER

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No Drawing. Application February 27, 1940, Serial No. 321,035

2 Claims. (Cl. 22—204)

My invention relates to casting a layer of metal upon another metallic object. It is employed particularly in forming a hard facing layer upon a steel tool.

In forming a hard abrasion resisting surface upon a steel pin, bushing and the like, by casting, some difficulty has been experienced in bonding the two metals together. Oxidation along the surface of the tool to be hard faced prevents or interferes with the securing of an integral attachment of one metal upon the other and a poor job results. The air included in the furnace tends to form oxides upon the tool when hot, particularly where an oxidizing atmosphere in the furnace is employed.

It is an object of the invention to provide means of obtaining a reducing atmosphere directly adjacent the point of application of the hard facing material to the work, thereby assuring a firm bond between the two metals.

I aim to prevent oxidation both of the metal being cast and of the metal on to which the cast is being made.

My invention consists of the use of reducing gases obtained by the action of heat upon materials in the sand of the mold at points closely adjacent the metal being cast. I mix with the sand of the mold a carbonaceous material from which carbon monoxide and carbon dioxide will be released through the heat of the furnace. The metal object, such for example as a bearing pin is placed in the mold thus treated with carbonaceous materials with a space thereabout to receive the hard facing material such, for example as stellite. The said hard material is then placed in a chamber above the mold and the mold and chamber capped in by a layer of sand. The hard material has a fusing point somewhat lower than that of the pin. The carbonaceous material in the sand may be barium carbonate, charcoal, coke, or some organic compound such as linseed oil. These materials are mixed in the sand of the mold and when the bearing and pin together with the charge of hard material are in place, the molds are placed in the furnace. As the furnace heats up to the fusing temperatures of the hard material, the sand will release the carbonaceous gases such as CO. These gases prevent access of the oxygen to the metallic surfaces of the molten metal and the metallic object upon which it is cast. Thus there is no formation of oxides on the metal to prevent a firm bond between the metals. Therefore the casting operation becomes uniformly reliable and the molten metal attaches itself integrally upon the surface of the pin. When the heat has been applied sufficiently to melt the charge of hard material, this molten metal will run by gravity downwardly into the recess about the pin and will attach itself to the surface of the pin. Due to the heat of the furnace, the outer surface of the pin reaches a sweating condition, so that the molten metal attaches and adheres thereto forming an integral bond.

The process of casting the hard surfacing material upon the pin is both time-saving and labor-saving, as compared with common methods of welding. By my method the results are uniformly good and superior to the results obtained by welding and the operation is materially expedited. Also, a large number of molds will be simultaneously placed in the furnace and acted upon to perform the hard facing operation, thus further cheapening the process.

What I claim as new is:

1. In forming a hard surfacing upon a metal object, the steps of forming a mold about the object by mixing with the sand of the mold a carbonaceous material adapted to release carbon monoxide by the action of heat, packing the mold material about said object, leaving a space adjacent to said object to receive said surfacing material, placing hard material above said mold, enclosing said object and hard material about with sand, heating said mold in a furnace to a temperature above the fusing point of said hard material but below the fusing point of said object, whereby the heat of said furnace will melt said hard material, causing it to flow by gravity into said space, and said carbonaceous material will release carbon monoxide and prevent forming of oxides.

2. The process of casting a hard metal surfacing of comparatively low melting point upon a tool of higher melting point comprising, forming about said tool a mold of sand impregnated with carbonaceous material adapted to release carbon monoxide by the action of heat, forming a space in said mold adjacent said tool to receive said hard metal, placing pieces of said hard metal above said space, enclosing said mold about said object and hard metal, placing said mold in a furnace and melting said hard metal in the presence of gas arising from said carbonaceous material.

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