This invention has reference to the heat-treatment of metals and alloys, and particularly to the bright-annealing of brass and other alloys that contain a constituent metal which volatilizes at annealing temperature.

It is well known that where articles made from such alloys are produced by rolling, drawing, pressing, or other methods that involve the use of oil or grease, it is not practically or economically possible to wholly remove the lubricant from the surfaces of the products before subjecting them to heat-treatment, with the consequence that when the lubricant is decomposed by the treatment heat, it deposits carbon on the products and causes surface discoloration. Similarly, where the lubricant contains moisture or other source of oxygen, such moisture or the like will be decomposed by the treatment heat and also set up surface discoloration.

The principal object of the present invention is to provide an annealing furnace which is adapted to perform a preliminary heating of the work in the treatment chamber to a temperature which will dry off moisture and volatilize or vaporize oil or other lubricant, but is lower than the temperature at which the said work is susceptible to oxidation in the presence of moisture, and substantially lower than the annealing temperature at which the volatile metallic constituent of the alloy may volatilize.

According to the present invention, this process is carried out in an annealing furnace in which a fan is employed for circulating atmosphere-gas through the work container and through an externally-heated passage which surrounds the said container and is adapted to be charged with an oxidizable medium, which medium becomes oxidized preferentially to the work under treatment. In the attached sheet of drawings, forming a part of this specification, I have illustrated a vertical sectional view of a furnace constructed in accordance with my present invention.

The preferred form of furnace includes a fan or propeller which will circulate the atmosphere or gas through the work, especially during the preliminary lubricant-removing treatment. It also embodies means whereby, during the preliminary heating, the gas-circulating passage may be vented, or placed in communication with the outside air, as, for example, by the valve-controlled exhaust pipes (c, c') to enable the discharge or exhaust of the volatilized or vaporized substances, whereas during the annealing treatment, the said container may be closed, or substantially closed or be so controlled at the vents as to permit only a slight outlet-flow of the atmosphere gas. The preliminary treatment may thus be continued until it is visually observed, from the condition of the exhaust, that the work has been adequately cleansed of lubricant, whereupon the exhaust vents may be closed, or substantially closed, to prevent or reduce the loss of atmosphere-gas during the subsequent annealing treatment.

The furnace illustrated comprises an externally-heated work-container which is normally enclosed in a bell (g), and the fan (a) is arranged in a chamber (a') outside the said container and the furnace is so constructed as to enable gas to be circulated by the fan through the work in the said chamber and through the annular chamber that is formed between the work-container and bell (b, g), and with which the fan-container is in communication.

The bright-annealing of brass or like products is assisted by the use of a body or charge of readily-oxidizable alloy (such as alloys of the same or similar constitution as the products or work to be annealed) which is in such a physical condition, and is so arranged with respect to the work-container and heaters of the furnace that it may readily be raised, in a given time, to a temperature higher than that of the work-charges. Such an oxidizable charge is shown in the drawing, marked f, and is located and arranged in the gas circulating system so that it is enabled when heated to the appropriate temperature, to take up from the circulating gas, any oxidizing substance, and/or any vaporized lubricant that may be removed from the work-charge during the annealing treatment.

Whereas, as in the furnace illustrated, the oxidizable charge is located in the gas passages outside the work-container it is heated by resistors (e) or the like contained in a chamber surrounding the said gas passages; the arrangement being such that when the furnace is in operation for annealing the work-charge, the oxidizable charge in the externally-heated gas passages is maintained at a temperature rather higher than that of the said work charge. This enables the oxidizable medium to be quickly heated to its effective temperature before the work-charge is brought to annealing heat.

The oxidizable medium which becomes oxidized preferentially to the work under treatment may consist of loosely-packed swarf or waste alloy in small pieces, or wire-mesh or the like, such as will not materially impede the circulation of gas through the system. The passages in
which the charge of swarf or the like is contained is so arranged that the said charge can be removed when the de-oxidizing efficiency of the alloy has become impaired, and be replaced by a clean or fresh charge.

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

1. A furnace for the cleaning and annealing of metals and alloys of metals, comprising a work-container; a passage communicating with said work-container; means for recirculating heated air through said work-container and passage; and an oxidizable medium within said passage and consisting of a metal or an alloy of metal of substantially the same constitution as the metal or alloy of metal within the work-container.

2. A process for the cleaning and annealing of metals and alloys of metals comprising the step of treating said metals or alloys of metals with heated air which has been passed in contact with an oxidizable medium consisting of a metal or an alloy of metal of substantially the same constitution as the metal or alloy of metal undergoing treatment.

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