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PRODUCING MOLYBDENUM ALLOYS

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The present invention relates to new and useful improvements in alloying molybdenum with ferrous metals and more particularly to a novel and improved molybdenum addition agent.

Heretofore, molybdenum-bearing ferrous alloys have been produced by the addition of molybdenum to the iron or steel either as calcium molybdate, some other molybdic acid salt, or as ferromolybdenum. However, each of these materials has its limitations and cannot be used universally for one reason or another. Calcium molybdate and other equivalent molybdic acid salts are satisfactory for the production of a wide range of ferrous alloys in the blast furnace as well as in the ladle, but are not satisfactory for the production of alloys, as in the electric furnace, where slag is objectionable. Ferro-molybdenum is considerably more costly than calcium molybdate and its use is generally restricted to those alloys for which calcium molybdate is not suited, although, except for the cost of the material it is of quite general application. Calcium molybdate, however, requires the production of the compound from roasted molybdenite, either by mixing and heating to high temperatures, or by mixing, wetting and briquetting.

The prior patents and literature describe other processes of producing molybdenum alloys which have not come into commercial use, or are of very limited commercial application, and in several of them, the molybdenum is described as being added to the blast furnace, or to the molten ferrous metal, in the form of roasted molybdenite or molybdic trioxide. These processes have proved to be of no commercial value, due to the high loss of molybdenum through volatilization and entrainment, as molybdic trioxide is a very light powder and has a relatively low volatilization point. Consequently, these processes will produce a commercially satisfactory recovery of molybdenum only where the molybdenum trioxide, or roasted molybdenite, is buried in the charge and will be trapped or absorbed by the upper layers of the charge before it escapes from the furnace. However, when the furnace is charged in this manner, only one alloy can be produced from the charge and it is generally not desired to produce so large an amount of any particular molybdenum alloy. Where the molybdenum trioxide or roasted molybdenite is thrown in, on top of the slag, it is generally volatilized before it mixes with the slag and only a small portion is recovered in the alloy.

The present invention has for its object the provision of a novel and improved composition of

matter for the introduction of molybdenum into ferrous alloys, and also provides a novel and improved form of molybdenum trioxide.

In accordance with the present invention, the molybdenum is added to the furnace or ladle in the form of briquettes composed of roasted molybdenite concentrates or molybdenum trioxide intimately mixed with a relatively small amount of still pitch, so as to form a hard, compact mass of relatively high specific gravity. These briquettes are suitable for the production of ferrous molybdenum alloys either in the blast furnace, electric furnace, or by the addition of the briquettes to the molten metal in the ladle. By the use of these briquettes, molybdenum may be introduced into the ferrous alloy practically without loss up to 1% molybdenum in the final alloy, and with only relatively small losses of molybdenum even where the alloy contains as much as 15% molybdenum.

Specifically, the briquettes of the present invention are preferably formed from roasted molybdenite concentrates, which are the technical grade of molybdenum trioxide and contain from 79 to 90% of molybdenum trioxide. This roasted molybdenite is mixed with a quantity of still-pitch which serves as a binder for the roasted molybdenite, and the proportions are such that the briquettes contain from 88 to 90% roasted molybdenite and from 10% to 12% of still-pitch. These briquettes are preferably cylindrical and may conveniently contain a predetermined and uniform amount of molybdenum. In practice, it is convenient for them to have a molybdenum content of 2.50 pounds, as this size makes for easy handling, and these briquettes are of sufficient size and weight to sink readily through the slag or into the molten ferrous metal. The uniform molybdenum content of these briquettes expedites the addition of the correct amount of molybdenum.

The use of pitch as a binder for the roasted molybdenite is particularly desirable as it generally contains more than 90% carbon, and the quantity specified not only serves to bind the roasted concentrate firmly together into a hard compact mass, but also approximately provides the correct stoichiometrical quantity of carbon to combine with the oxygen in the roasted concentrate, thereby preventing a change in the carbon content of the final ferrous alloy.

The briquettes of the present invention are extremely economical due to the low cost and small amount of the added material and also to the fact that they can be manufactured simply and