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BRIQUETTE FOR THE ADDITION OF MOLYBDENUM TO FERROUS ALLOYS

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The present invention relates to a novel and improved molybdenum addition agent for the production of ferrous alloys.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the compositions, steps, processes and instrumentalities pointed out in the appended claims.

The invention consists in the novel compositions, steps, processes, combinations and improvements herein shown and described.

The present invention has for its object the provision of a novel and improved molybdenum containing alloying agent which is of wide usefulness in the production of molybdenum containing ferrous alloys. The invention further provides a novel and improved molybdenum briquette which can be economically produced and contains a minimum of foreign material. The invention has for another object the provision of an improved molybdenum containing briquette which can be used in practically all ways that other molybdenum addition agents have heretofore been used, and which is superior in one respect or another to all of the previous molybdenum addition agents.

Heretofore molybdenum has been added to ferrous alloys, by a large number of different processes involving a wide variety of different addition agents. Molybdenum sulfide or molybdenite concentrates have been proposed and used as an addition agent but have proved to be of very limited application due to the relatively large proportion of sulphur contained therein and introduced thereby into the ferrous alloy. Molybdenum trioxide, roasted molybdenite and molybdenum dioxide, all oxides of molybdenum, have been used as addition agents, but their use has almost invariably been attended by excessive loss of molybdenum, resulting in an increased cost of producing the alloy, and furthermore their use has been limited to the production of ferrous alloys to contain less than 1 per cent of molybdenum. Calcium molybdate, combinations of lime with lower oxides of molybdenum and mechanical mixtures of calcium oxide and molybdenum trioxide have also been used as addition agents, but their use is limited to the production of iron-molybdenum alloys containing less than 1 per cent of molybdenum, and have been attended by an unavoidable increase in the slag, as well as by the detrimental inclusion of slag within the alloy.

Various varieties of ferro-molybdenum have also been widely used for the production of molybdenum-bearing ferrous alloys, and while there is no practical limit to the amount of molybdenum which may be contained in the alloys produced therewith, this type of addition agent has necessarily increased the cost due to the extra operations required for the manufacture of ferro-molybdenum. Ferro-molybdenum has the added disadvantage that it sinks to the bottom of the ladle and the resulting ferrous alloy is rendered homogeneous only with difficulty. Briquettes of a molybdenum oxide with carbon have been widely used, and while they avoid many of the disadvantages of the other alloying agents, they produce a boil, and when large percentages of molybdenum are to be added in this way, the gas evolution may be excessive. Molybdenum silicide has also been used as an addition agent where a fairly high silicon content in the resulting alloy is unobjectionable. At other times, pure molybdenum powder has been used as the addition agent, but aside from the relatively expensive cost of producing molybdenum powder, the absorption of the molybdenum into the ferrous alloy is too slow to be commercially desirable.

In general, the various ways in which molybdenum has been added to ferrous alloys have been less effective substitutes for the universally useable ferro-molybdenum, which has its relatively high cost and its relatively high specific gravity as its primary commercial disadvantages.

In addition to the foregoing, there have been other minor ways proposed for the addition of molybdenum to ferrous alloys, but these have not met with any considerable commercial use, and among them may be mentioned the mixtures of molybdenum trioxides with silicon and/or ferro-silicon.

The present invention provides an economical molybdenum addition agent for ferrous alloys, which eliminates the use of any relatively expensive reducing agents, the availability of which may be restricted, such as aluminium, silicon, magnesium and calcium, requires a minimum of equipment for its production, eliminates the objections which have existed with respect to all of the commercially used addition agents set forth above, and does not result in the introduction into the molten ferrous metal of any foreign material.

Thus, the molybdenum addition agent of the present invention provides a universally acceptable molybdenum containing compound for the introduction of molybdenum into ferrous alloys