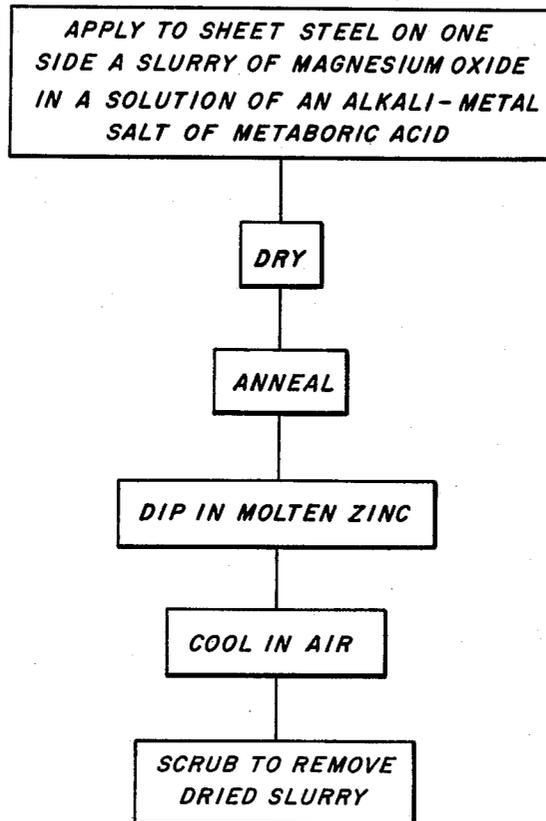


May 14, 1963

J. C. SIPLE  
METHOD AND COMPOSITION FOR SHIELDING STEEL  
FROM MOLTEN COATING METAL  
Filed May 4, 1961

3,089,780



INVENTOR.  
JAMES C. SIPLE

By *Donald G. Dalton*

Attorney

1

2

3,089,780

**METHOD AND COMPOSITION FOR SHIELDING STEEL FROM MOLTEN COATING METAL**

James C. Siple, Mount Lebanon Township, Allegheny County, Pa., assignor to United States Steel Corporation, a corporation of New Jersey

Filed May 4, 1961, Ser. No. 107,630

4 Claims. (Cl. 117-5.5)

This invention relates to the manufacture of sheet steel coated with protective metal on one side only.

As explained in Greene et al. Patent No. 2,894,850, a demand has arisen for steel sheets galvanized on one side only. These patentees disclose the coating of sheet steel on one side with a shielding layer of sodium aluminate, before galvanizing by hot-dipping, to prevent the adherence of zinc to the surface previously coated with aluminate.

I have invented a novel composition for this purpose which has important advantages over sodium aluminate. In accordance with my invention, I form a slurry of magnesium oxide in a solution of an alkali-metal salt of metaboric acid such as sodium metaborate. This provides an inexpensive yet effective shielding layer which is readily removable by washing with water after the zinc coating has been applied to one side of the sheet.

The essential steps of a typical example of my method are shown in the accompanying drawing which is a flow sheet of the method.

More specifically, my shielding composition is a slurry of fully calcined magnesium oxide in a solution of an alkali-metal metaborate. I prepare a mixture containing from 3 to 20% sodium metaborate, for example, by weight, preferably about 6%, and from 12 to 28% of the oxide, by weight, preferably about 21%, and the balance water. This mixture, well stirred, is applied to one side of low-carbon sheet steel, containing less than 0.75% silicon, preferably in strip form, in any convenient manner as by brushing, spraying or roller coating of which the latter is preferred. The coating is dried by mild heating after which the solid material remaining amounts to about 1 gram per square foot.

The steel is then passed through a galvanizing bath, preferably after a conventional continuous annealing treatment. After the galvanized strip is cooled in air, the shielded surface of the strip is scrubbed with water to remove the oxide-metaborate film. A light scrubbing is sufficient to remove the shielding coating, leaving the uncoated surface of the steel exposed throughout. The side of the steel sheet not coated with the oxide-metaborate film, of course, is uniformly coated with zinc as a result of passage through the galvanizing bath. If necessary, a gas flame is directed onto the shielded side of the steel as it emerges from the galvanizing bath, to remove any zinc particles which may be mechanically dragged out.

The invention has numerous advantages over prior practice. In the first place, the oxide-metaborate film

may be used successfully where continuous annealing occurs just before the galvanizing. Secondly, the shielding layer is composed of inexpensive materials, and may be easily applied and removed. It effectively prevents coating by zinc on the shielded side and, when removed, leaves a steel surface suitable for welding, painting or other treatment. The shielding film is tightly adherent and abrasion-resistant so as to permit passing through the annealing process without damage. Thus the invention may be utilized without altering conventional annealing and galvanizing practice.

Potassium metaborate and other alkali-metal metaborates may be used in place of the sodium salt. Calcium oxide may be used instead of magnesium oxide, or a mixture of both. The shielding composition of my invention may also be used to prevent coating of steel with aluminum, tin and terne when immersed in molten baths thereof.

Although I have disclosed herein the preferred embodiment of my invention, I intend to cover as well any change or modification therein which may be made without departing from the spirit and scope of the invention.

I claim:

1. A composition for shielding steel from coating by metal when immersed in a molten bath thereof consisting essentially of a water slurry containing from 12 to 28% by weight of an oxide selected from the group consisting of calcium oxide and magnesium oxide, and from 3 to 20% by weight of an alkali-metal metaborate.

2. A composition as defined in claim 1 wherein the salt is sodium metaborate.

3. A composition for shielding steel from coating by metal when immersed in a molten bath thereof consisting essentially of a water slurry containing about 21% magnesium oxide by weight and about 6% of an alkali-metal metaborate by weight.

4. A method of shielding steel from coating by metal selected from the group consisting of aluminum, zinc, tin and terne, when immersed in a molten bath thereof, which comprises applying to the surface of the steel a water slurry consisting essentially of from 12 to 28% by weight of an oxide selected from the group consisting of calcium oxide and magnesium oxide, and from 3 to 20% sodium metaborate by weight and drying the resulting film, then immersing the steel in the bath.

References Cited in the file of this patent

UNITED STATES PATENTS

940,111	Ackermann	Nov. 16, 1909
2,343,158	Scott	Feb. 29, 1944
2,502,198	Benner et al.	Mar. 28, 1950
2,618,530	Gardner	Nov. 18, 1952
2,858,235	Rex	Oct. 28, 1958
2,894,850	Greene et al.	July 14, 1959
2,955,958	Brown	Oct. 11, 1960

FOREIGN PATENTS

725,778	Great Britain	Mar. 9 1955
---------	---------------	-------------