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CLEANING AND PICKLING OF METALS.

No Drawing.

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This invention relates to the cleaning and pickling of metals, and particularly to the pickling of iron or steel, to remove scale therefrom, although the invention is of more or less general application to the cleaning or pickling of metals such as iron or steel for the removal of oxides or scale therefrom.

The pickling or cleaning of iron or steel is commonly effected by means of acid pickling or cleaning baths which remove the scale or oxide from the metal. The pickling baths commonly employed are acid baths which often attack the metal as well as the scale. This action on the metal is undesirable and objectionable, involving not only excessive consumption of acids, but also corrosion or dissolving of metal and tending to give a rough or pitted surface.

The present invention provides an improved bath for pickling or cleaning metal and also an improved process of pickling or cleaning the metal in which the acid pickling bath has incorporated therein a small amount of inhibiting mercapto compounds and particularly a mercapto thiazole.

I have found that the addition of a small amount of suitable mercapto compounds and particularly a mercapto thiazole prevents or retards or inhibits the attack of the acid pickling bath on the metal without interfering with the removal of scale or oxide by the acid bath.

The agents which may be added to the cleaning or pickling bath, according to the present invention, include various mercapto compounds and particularly mercapto thiazoles or compounds of these thiazoles such as mercaptobenzo-thiazole, 2-mercapto-4-methyl-benzo-thiazole, 2-mercapto-4,6-dimethyl-benzo-thiazole, 2-mercapto-benzothiazole, 2-mercapto-5-phenyl-thiazole, or a compound such as the diphenylguanidine salt of a mercaptobenzothiazole.

The acid pickling baths with which the agents mentioned are used may be acid baths such as are commonly employed for pickling or cleaning iron and steel, containing for example about ten percent of sulfuric acid. Such baths are gradually impoverished by the action of the acid in removing the scale or rust and their content of ferrous sulfate increases until the bath becomes too weak or too concentrated in ferrous sulfate for

further use. Instead of using sulfuric acid baths, other acid baths can be used including acid sulfate baths.

The amount of the mercapto compounds such as mercapto thiazole added to the bath for carrying out the pickling or cleaning operation can be varied. In general, only a small amount of a suitable compound is required, for example, a small fraction of one percent. In the case of mercaptobenzothiazole, for example, about two to five pounds of the compound can be employed for each ton of 60 degree acid used in the pickling bath. The mercapto thiazole employed should be one which is stable and does not decompose to any objectionable extent in the acid bath.

The carrying out of the pickling or cleaning operation may be the same as in ordinary practice. For example, the pickling can be carried out continuously by passing the material to be pickled, such as wire or sheets, through a number of baths in a regulated manner; or by immersing the article to be pickled in the pickling bath for a suitable period of time. The temperature of the bath can be varied, ordinarily being around 150 to 180° F. The pickling bath may be replenished by the addition of further amounts of acid until the iron sulfate reaches too great a concentration.

The addition of the mercapto compound to the bath prevents or retards or inhibits the action of the acid bath on the metal without interfering with the removal of scale or oxide. The formation of hydrogen by the action of the acid bath on the metal is also reduced and the production of acid mist or fumes also greatly reduced. There is also a saving in the acid as well as a protection of the metal. The reduced amount of action of the acid on the metal and the reduction in amount of hydrogen produced correspondingly reduces the amount of hydrogen absorbed by the metal.

The employment of the thiazole in the pickling or cleaning operation, according to the present invention, involves but small additional expense and results in advantages in operation, economy of acid, protection of the metal from attack, etc., which materially improve the pickling and cleaning operation.

I claim:

H₂SO₄
+ mercaptobenzothiazole

1. A non-oxidizing mineral acid bath for cleaning or pickling metals which comprises a small amount of a mercaptothiazole.

2. A non-oxidizing mineral acid bath for
5 cleaning or pickling metals which comprises a small amount of a mercaptobenzothiazole.

3. A bath for cleaning or pickling metals comprising sulfuric acid and a small amount of a thiazole.

4. A bath for cleaning or pickling iron 10 or steel comprising sulfuric acid and a small amount of a mercaptothiazole.

5. A bath for pickling or cleaning metals comprising sulfuric acid and a small amount of a mercaptobenzothiazole.

In testimony whereof I affix my signature. 15

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