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PROCESS AND QUENCHING BATH FOR HARDENING STEEL ARTICLES

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This invention relates to a process for hardening and treating steel to render it corrosion-proof and to a formula for a quench solution.

It has long been known that steel may be treated by heating it to an elevated temperature and then quenching it in a bath of oil, water, or brine. Such a treatment hardens and strengthens the steel to a marked degree, but it would be desirable to have available a quench bath which is even superior to known quenching agents.

I have found that by quenching steel in a bath made in accordance with the present invention superior results are obtained as compared to conventional quenching baths with respect to the hardening and strengthening of the steel, but particularly have found that with the use of the bath of the present invention the steel is rendered corrosion-proof. After articles have been quenched in accordance with the present invention, they have a shiny surface which is highly desirable and which resists corrosion for long periods of time.

In accordance with the present invention, a quenching bath is made up as follows:

24 oz. sodium chloride, by weight—dry
19 oz. sodium hydroxide, by weight—dry
2 oz. sodium carbonate, by weight—dry
2 oz. sodium sulphate, by weight—dry
1 oz. alum, by weight—dry
1 gallon distilled water.

The above composition, except for the water, may be mixed together and packaged as a dry mix, and the water added later.

To use the bath of the present invention, it is only necessary to heat the steel to the critical point and then plunge the steel into the bath. Ordinarily, the bath is maintained at room temperature although higher or lower temperatures may be used.

Ordinary SAE 10–20 carbon steel has a tensile strength of about 50,000 p. s. i. In addition, such steel has a low C-Rockwell hardness. When a ½" bolt of such steel is heated to a temperature of about 1,850° F. and quenched in the bath of the present invention, the tensile strength is increased to 198,300 pounds per square inch. The Rockwell hardness is increased to 42 on the C scale. Yield strength 37,400 lbs. When repeated, except that the temperature was 1,650° F., the ultimate strength was 137,400 lb. p. s. i.

SAE 10–10 steel has been heated to 2,000° F. and quenched in the bath of the present invention, and the ultimate strength found to be 85,290 pounds per p. s. i.

SAE 10–10 steel was heated to 1,850° F. and quenched in the bath of the present invention. It had an ultimate strength of 125,120 lb. p. s. i.

SAE 41–40 was heated to 1,850° F. and quenched in the bath of the present invention. It had a Rockwell C hardness of 67.

SAE 10–30 steel was heated to 1,850° F. and quenched and found to have an ultimate strength of 49,650 p. s. i.

Three samples of cast steel having carbon contents of 0.12; 0.14 and 0.16% were heated to 1,650° F. and quenched in the bath of the present invention. Each had a Brinell hardness of 375 and the sample of 0.14% carbon content had a tensile strength of 180,000 lb. p. s. i.

In addition to the great increases in hardness, the steel was rendered shiny and corrosion-resistant. Although I have given the preferred formula for my hardening bath, it is to be understood that reasonable variations can be made in the composition without departing from the spirit of the present invention.

I claim:

1. A quenching bath for hardening steel articles, comprising the following in substantially the proportions named:

24 oz. sodium chloride, by weight—dry
19 oz. sodium hydroxide, by weight—dry
2 oz. sodium carbonate, by weight—dry
2 oz. sodium sulphate, by weight—dry
1 oz. alum, by weight—dry
1 gallon distilled water.

2. A process for hardening steel comprising heating the steel to the critical point and immediately plunging it into a bath made in accordance with the following composition:

24 oz. sodium chloride, by weight—dry
19 oz. sodium hydroxide, by weight—dry
2 oz. sodium carbonate, by weight—dry
2 oz. sodium sulphate, by weight—dry
1 oz. alum, by weight—dry
1 gallon distilled water.

3. As a new composition of matter:

24 oz. sodium chloride, by weight—dry
19 oz. sodium hydroxide, by weight—dry
2 oz. sodium carbonate, by weight—dry
2 oz. sodium sulphate, by weight—dry
1 oz. alum, by weight—dry

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