To all whom it may concern:

Be it known that I, WILLIAM YONKMAN, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Methods of Rust Removal and Prevention, of which the following is a full, clear, concise, and exact description.

This invention relates to a process for removing rust from the surface of iron and steel and preventing the subsequent rusting of the said surfaces. An object of the invention is to provide a method for this purpose of such character that in its practice the surface of the metal will not be attacked.

The invention consists in subjecting the rusted part, as for instance by immersion in a bath, to a solution of ammonium citrate. It has been found in practice preferable to maintain the bath between 175° and 215° Fahrenheit and to retain the parts therein for a period of from 3 to 15 minutes, the period of immersion, however varying with the amount of rust to be removed.

Ammonium citrate will dissolve all of the iron oxide (rust) on the parts without attacking the surface of the metal. This feature is especially important where it is desirable that the dimension of the parts after cleaning be approximately identical with their dimensions prior thereto.

The parts are next removed from the ammonium citrate bath and washed in water to remove the ammonium citrate. It has been found preferable to wash the parts by immersing them in water heated at approximately 175° or higher, retaining the parts in the water a time sufficient to heat them, whereby upon removal from the water they will dry rapidly.

The hot parts are then subjected, as for instance by dipping in a bath, to a soluble chromate solution such as sodium chromate or sodium bichromate. These materials act as rust inhibitors and do not attack the surface of the metal.

The chromate solution may be kept at room temperature since the submersion of the heated parts is for so short a time that they are not sufficiently cooled to prevent rapid drying after removal.

To further insure against subsequent rusting, after the parts have dried following their treatment in the chromate bath, they are finally coated with a waterproof oil such as a mixture of vaseline and benzine or vaseline and kerosene.

What is claimed is:

1. A method of rust removal and prevention, consisting in subjecting the rusted surface first to a solution of ammonium citrate and then to a soluble chromate solution.

2. A method of rust removal and prevention, consisting in subjecting the rusted surface to a hot solution of ammonium citrate and then to a soluble chromate solution.

3. A method of rust removal and prevention, consisting in subjecting the rusted surface first to a solution of ammonium citrate and then to a solution of sodium chromate.

4. A method of rust removal and prevention, consisting in subjecting the rusted surface first to a solution of ammonium citrate maintained at a minimum temperature of approximately 175° Fahrenheit and then subjecting the said surface to a soluble chromate solution.

5. A method of rust removal and prevention, consisting in subjecting the rusted surface to a solution of ammonium citrate, then washing said surface with water to remove the ammonium citrate, and finally subjecting the said surface to a soluble chromate solution.

6. A method of rust removal and prevention, consisting in subjecting the rusted surface to a solution of ammonium citrate then subjecting the surface to a solution of sodium chromate, drying the surface and finally coating it with a waterproof oil.

7. A method of rust removal and prevention, consisting in subjecting the rusted surface to a solution of ammonium citrate, washing the surface with water to remove the ammonium citrate, then subjecting the surface to a solution of sodium chromate, drying the surface, and finally coating it with a waterproof oil.

8. A method of rust removal and prevention, consisting in subjecting the rusted surface to a solution of ammonium citrate, washing the surface with water to remove the ammonium citrate, then subjecting the
surface to a solution of sodium chromate, drying the surface, and finally coating it with a hydrocarbon oil.

9. A method of rust removal and prevention, consisting in subjecting the rusted surface first to a solution of ammonium citrate and then to a soluble bi-chromate solution.

10. A method of rust removal and prevention, consisting in subjecting the rusted surface first to a solution of ammonium citrate maintained at a minimum temperature of approximately 175° Fahrenheit, then washing said surface with water heated to a minimum temperature of approximately 175° Fahrenheit to remove the ammonium citrate and finally subjecting the said surface to a soluble chromate solution.

In witness whereof, I hereunto subscribe my name this 20th day of September A. D. 1922.

WILLIAM YONKMAN.