

UNITED STATES PATENT OFFICE.

JAMES CHURCHWARD, OF NEW YORK, N. Y.

TEMPERING-BATH FOR STEEL.

No. 845,755.

Specification of Letters Patent.

Patented March 5, 1907.

Application filed September 18, 1906. Serial No. 335,153.

To all whom it may concern:

Be it known that I, JAMES CHURCHWARD, a subject of the King of Great Britain, residing in the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Tempering-Baths for Steel, of which the following is a specification.

This invention relates, as its title indicates, to baths for quenching steel to impart a special hardness thereto.

Hitherto the common custom has been to heat the steel and then plunge it into water or oil. In my United States Patent No. 832,771, of October 9, 1906, I have described and claimed a quenching-bath containing a phenol or phenol derivative mixed with an oil or other fatty substance, and this I do not claim broadly herein; but the object of this invention is to provide a bath containing mercury and a fatty substance for special hardening, the latter being adapted for use with special advantages in connection with the aforesaid phenol-bath.

In carrying out the invention in an approved form a suitable proportion of a phenol—such as carbolic acid (phenyl hydroxid) or creosote, (a monomethyl phenol,) for example—with some fatty substance—such as glycerin (glycerol) or linseed-oil, for example—form the quenching-bath.

For steel heated up to about 1,400° Fahrenheit to 1,600° Fahrenheit a bath composed as follows, in a suitable tank or receptacle, will produce good results:

Carbolic acid	30%	to	50%
Linseed-oil	70%	to	50%

100	100
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The bottom of said receptacle is lined or covered with a layer of mercury and lard mixed together, as follows:

Mercury	30%	to	50%
Lard or fat	70%	to	50%

100	100
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The mixture of mercury and lard or fat may

be used in various ways. For instance, it can be made and kept in a separate receptacle. Then first plunge the heated metal in the phenol-bath until its temperature is reduced about 200°, then place it in the mercury mixture until the temperature is reduced to about 800° Fahrenheit, and then again plunge it into the phenol-bath until cooled; but the most simple, safest, and the most effective way is to have the mercury mass covered by the phenol and oil liquid, and then when the heated metal comes in contact with the mercury and fat the dangerous fumes arising therefrom will be filtered by the oil and escape in a much less dangerous form, if not in an absolutely harmless form. Other great advantages are also found in the bath of oil and phenol covering the mercury mass. For instance, in tempering a tool the edge or cutting part only may be submerged in the mercury, thus giving an extremely hard edge or point with a toughened back, or in the case of an armor-plate an extremely hard face where it has rested in the mercury and a tough face where it has not come in contact with the mercury.

The bath should be kept as cool as possible and the tool or plate should remain in it until reduced to a temperature of 300° Fahrenheit to 500° Fahrenheit. It may then be taken out and sprayed with cold water until absolutely cold, when there would be no chance of semi-annealing from internal heat.

The proportions of the ingredients of the quenching-bath may be varied somewhat without departing from the spirit of the invention.

The words "fatty substance or material" as herein used are meant to include glycerin, oils of all kinds, and other substances containing fatty acids.

I am aware that it has been proposed to use liquid mercury as a tempering-bath after the steel has been rolled in borax, and this I do not claim. In accordance with the present invention the mercury used is mixed with some fatty substance and when used with a phenol-bath it will be at the bottom with the lighter fatty substances above it.

Having thus described my invention, I claim—

1. A quenching-bath for steel, containing mercury and a fatty substance.
- 5 2. A quenching-bath for steel, containing mercury, linseed-oil, and a phenol, the mercury being at the bottom of the bath.
3. A quenching-bath for steel containing mercury, linseed-oil, and carbolic acid, the
10 mercury being at the bottom of the bath.

4. A quenching-bath for steel, containing a phenol-bath having at its bottom a mixture of mercury with a fatty substance.

In witness whereof I have hereunto signed my name, this 17th day of September, 1906, 15
in the presence of two subscribing witnesses.

JAMES CHURCHWARD.

Witnesses:

WILLIAM J. FIRTH,
H. G. HOSE.