UNITED STATES PATENT OFFICE.

HARRY MOWER LEE AND FRANK GILLANDERS BOOTH, OF NEW LONDON, CONNECTICUT, ASSIGNORS, BY MESNE ASSIGNMENTS, TO STEEL TEMPERING PROCESS COMPANY, A CORPORATION OF NEW JERSEY.

COMPOUND FOR TREATING STEEL.

987,468. Specification of Letters Patent. **Patented Mar. 21, 1911.**

No Drawing. Application filed May 31, 1910. Serial No. 564,160.

To all whom it may concern:

Be it known that we, HARRY M. LEE and FRANK G. BOOTH, both citizens of the United States, and residents of New London, in the county of New London and State of Connecticut, have invented a new and Improved Compound for Treating Steel, of which the following is a full, clear, and exact description.

This invention relates to a new and improved compound to be used in hardening and tempering steel, and describes the method of using the same.

An object of this invention is to provide a compound which will be simple in nature, inexpensive to manufacture, and surprisingly efficient in its results under varying conditions.

This and further objects, together with the character and combination of elements, will be more fully described hereinafter and particularly set out in the claims.

In this invention, the material to be treated is heated in any suitable manner, as by means of a gas furnace, a blacksmith's forge, or the like, to the desired temperature, which will vary according to the carbon content of the steel, and also according to the hardness desired. The steel, when heated to the desired point, is then plunged, for the purpose of suddenly cooling, into a bath formed of the compound which is an important part of this invention. This compound preferably consists of a plurality of oxidizing agents intimately mixed in a liquid, which may be of any suitable character, but preferably consists of an oil. This oil may be of any suitable character, but preferably is of a type having a flashing point of not less than six-hundred degrees Fahrenheit. An oil which has been used with great success for this purpose and therefore preferred is known as "auto amber oil". The oxidizing agents which are used in this solution are of such a character that they coöperate with each other and with the oil to chemically influence the formation of the cementite, so as to produce a steel of great hardness and the desired toughness. These ingredients are preferably potassium chlorate ($KClO_3$) and manganese dioxid (MnO_2). It is to be noted that the first of these odixizing agents contains potassium and chlorin, and that the other contains manganese. The exact action of these elements in the solution is not known. It may be that by their presence they regulate the formation of cementite and other compounds in the metal, either merely as catalytic agents, or by chemically breaking up into nascent elements or compounds, together with small quantities of the oil, and effect, by chemical reaction, the formation of compounds of the carbon with the iron. However, it is clear that the best results have been obtained with these particular compounds which are oxidizing agents containing chlorin, potassium and manganese. While these ingredients may be mixed in various proportions and obtain efficient results thereby, we have found that the most efficient results are obtained by mixing four drams of potassium chlorate, and two drams of manganese dioxid with each gallon of oil.

It has been found that by using this solution as a hardening solution, steels can be hardened to the same degree without the necessity of previously heating the steel to an excessive amount, as has been found in the case of certain types of steels when using other hardening solutions. This solution may be also used in drawing the temper of steel, and in such a case, it is heated to the desired degree, and the steel placed therein until the temper has been drawn the desired amount.

While we have shown one embodiment of our invention, we do not wish to be limited to the specific details thereof, but desire to be protected in various changes, modifications and alterations which we may make within the scope of the appended claims.

Having thus described our invention, we claim as new and desire to secure by Letters Patent:—

1. A steel-treating solution, comprising a chlorate, an oxidizing agent, and a fluid.

2. A steel-treating solution, comprising a chlorate, an oxidizing agent, and an oil.

3. A steel-treating solution, comprising an oxidizing agent, manganese dioxid, and a fluid.

4. A steel-treating solution, comprising potassium chlorate, manganese dioxid, and an oil.

5. A steel-treating solution, comprising

potassium chlorate, manganese dioxid, and an oil having a flashing point as high as six-hundred degrees Fahrenheit.

6. A steel-treating solution, comprising an oxidizing agent, and an oil having a flashing point at least as high as six-hundred degrees Fahrenheit.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

HARRY MOWER LEE.
FRANK GILLANDERS BOOTH.

Witnesses:
G. H. PHILLIPS,
WILLIAM H. CLARKE.