

# UNITED STATES PATENT OFFICE.

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TO GEORGE NASH, OF NEW YORK, N. Y.

## MELT OR BATH FOR HARDENING STEEL.

No. 812,178.

Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, SHIPLEY NEAVE BRAYSHAW, a British subject, and a resident of Hulme, Manchester, in the county of Lancaster, England, have invented certain new and useful Improvements in Melts or Baths for Hardening Steel, of which the following is a specification.

In the hardening of steel tools or other articles it is customary to use a bath of molten lead or alloy or a melt of potassic cyanid, (KCN,) in which the articles are immersed to bring them up to the desired temperature, lead or lead alloy being more commonly employed. I find that much better results may be obtained by employing a salt which is soluble in water and which is fusible at about 700° centigrade, and while sodium chlorid and potassium chlorid each separately melt at a much higher temperature than that I find that by mixing them in suitable proportions they will melt at any desired temperature between 680° and 770° centigrade.

My invention consists, essentially, in forming a melt or bath for hardening steel of sodium chlorid (NaCl) and potassium chlorid (KCl,) to which may be added a small proportion of potassic ferrocyanid  $K_4Fe(CN)_6$ .

In carrying out the invention I mix together in the desired proportions crystalline or ground sodium chlorid and potassium chlorid. This is placed in a melt-pot and gradually heated until fused in a gas or other furnace.

The melt or bath is maintained fused when in use by the continuous application of heat from gas-jets or other flame.

The quantity or proportion of the potassium chlorid may be varied according to the temperature required. The higher the temperature required the less of the potassium salt is required.

I find that in use this melt or bath will

have the following advantages over lead: The salt is non-poisonous. It is much lighter than lead and easier to handle. It is much cheaper than lead bulk for bulk. The articles sink in without being forced down. It does not form dross on the surface. It is more fluid and circulates more freely than lead. It is more gentle in its heating action than lead. It remains as a glaze over the surface of the article when removed from the melt and keeps the article hot until it is actually immersed in the water. As soon as the articles are immersed in water the whole of the salt is removed instantly, as the salt does not adhere to the teeth or other parts of the articles as does lead.

A conspicuous advantage over potassic cyanid is that the melt may be made carburizing by the addition of potassic ferrocyanid  $K_4Fe(CN)_6$  or other suitable carburizing agent to any extent desired, or the melt may be left perfectly neutral—i. e., with no tendency to carburize or to oxidize.

What I claim as my invention, and desire to protect by Letters Patent, is—

1. A melt or bath for hardening tools or articles of steel comprising a fusible compound of sodium chlorid (NaCl), and potassium chlorid (KCl) substantially as described.

2. A melt or bath for hardening tools or articles of steel comprising a compound of several salts soluble in water, any one of which separately melts at a higher temperature than the compound and a carburizing agent substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

SHIPLEY N. BRAYSHAW.

Witnesses:

I. OWDEN O'BRIEN,  
B. TABHAM WOODHEAD.