

UNITED STATES PATENT OFFICE.

FRANCIS C. FRARY, OF MINNEAPOLIS, AND STERLING N. TEMPLE, OF ST. PAUL,
MINNESOTA; SAID TEMPLE ASSIGNOR OF ONE-SIXTH OF THE WHOLE RIGHT TO
SAID FRARY.

COMPOSITION OF HARD LEAD ALLOYS.

1,158,675.

Specification of Letters Patent.

Patented Nov. 2, 1915.

No Drawing.

Application filed August 13, 1915. Serial No. 45,379.

To all whom it may concern:

Be it known that we, FRANCIS C. FRARY and STERLING N. TEMPLE, citizens of the United States, and residents, respectively, of Minneapolis, in the county of Hennepin and State of Minnesota, and St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in the Composition of Hard Lead Alloys, of which the following is a specification.

Our invention has for its object to provide an improved form of hard lead alloy, adaptable to the customary uses of such alloys. In order to obtain the necessary hardness and other properties, it has been customary to add a considerable proportion of antimony to the lead. This is at present expensive as compared with lead, and moreover so much of it must be used that the specific gravity of the alloy is very much reduced thereby. For the manufacture of bullets and ammunition, it is very desirable to obtain a hard alloy of the maximum specific gravity, in order to concentrate the maximum of kinetic energy in the minimum of volume.

In carrying out our invention we use a very small amount of metallic magnesium in a main body of lead. We find that a very small amount of magnesium has as great a hardening effect as a much greater quantity of antimony, and that less than one per cent. of magnesium is sufficient to produce a hard lead alloy of commercial value. We have also found that the alloy containing a small amount of magnesium is improved by the addition of a small amount of metallic copper. This causes the alloy to be very tough, and not have the brittleness which characterizes ordinary antimonial lead.

We have obtained the best results with alloys containing one-half per cent. of magnesium, or one-half per cent. of magnesium and one-fourth to one-half per cent. of copper. These alloys are very hard, tough, and have a high specific gravity.

What we claim is:

1. As a new article of manufacture, hard-lead alloys containing in addition to a main body of lead, a small amount of metallic magnesium.

2. As a new article of manufacture, a metallic alloy having a main body of lead and containing a small amount of metallic magnesium and also a small amount of metallic copper.

3. As a new article of manufacture, a metallic alloy having a main body of lead, and containing metallic magnesium in an amount less than one per cent.

4. As a new article of manufacture, a metallic alloy having a main body of lead and containing metallic magnesium and metallic copper, each in amounts less than one per cent.

Signed at Minneapolis, Minn., this 5th day of August, 1915.

FRANCIS C. FRARY.

Witnesses:

ALICE W. FRARY,
W. KRITCHEVSKY.

Signed at Morristown, Minn., this 10th day of August, 1915.

STERLING N. TEMPLE.

Witnesses:

J. C. TEMPLE,
ISABELLE M. TEMPLE.