

## UNITED STATES PATENT OFFICE.

FERDINAND L. RAMON, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE-HALF TO PERCY D. BAILEY, OF SAN FRANCISCO, CALIFORNIA.

## PROCESS OF HARDENING IRON.

SPECIFICATION forming part of Letters Patent No. 784,124, dated March 7, 1905.

Application filed March 3, 1904. Serial No. 196,414.

*To all whom it may concern:*

Be it known that I, FERDINAND L. RAMON, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Processes of Hardening Iron, of which the following is a specification.

The invention relates to the process of hardening iron by means of the admixture therewith of a lighter metal and heating such metals to white heat, then adding a non-metallic element, and reducing the whole to the molten state by the application of additional heat, so as to be ready for pouring, and has for its object the production of a mixed metal superior to steel as regards weight, strength, toughness, and in other respects, as hereinafter specially mentioned.

My process consists in taking from five to twelve per centum of aluminium, inclusive, and placing the same in a crucible, thereupon adding iron, such as is now used in the manufacture of steel, to the total percentage of one hundred per centum, inclusive, and heating the metals to white heat, and then placing a quantity of sulfur equivalent to one part of the whole in bulk in such crucible, whereupon the contents thereof are reduced to the molten state by the application of additional heat, so as to be ready for pouring for the formation of the finished product. The said product may be made in an electric furnace or coke-furnace, if preferred. By the use of an electric furnace the process will require about one minute; but by using a coke-furnace the same will require from two to

three hours. The hardness of the product is increased with the use of additional parts of aluminium, the use of five per centum thereof of making the product as soft as may be desired, while the maximum hardness of such product is attained by the use of twelve per centum thereof. The toughness of the product remains, notwithstanding the use of a less or greater quantity of aluminium within the limits mentioned. The said product weighs about one-half the weight of an equal quantity of steel and is tougher than the same. It is non-magnetic and non-corrosive, and the cost of making the same is about two-thirds the cost of producing steel. The use of twelve per centum of aluminium in the manufacture of said product will make a mixed metal equal to the best grade of steel.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

The herein-described process of hardening iron which consists in forming an alloy of iron and aluminium by placing the metals in a crucible, heating the same to white heat, then placing on the metals a small quantity of sulfur and reducing such metals to a molten state by the application of additional heat, so as to be ready for pouring for the formation of the finished product, substantially as and for the purposes specified.

In testimony whereof I affix my signature in presence of two witnesses.

FERDINAND L. RAMON.

Witnesses:

PERCY D. BAILEY,  
A. COLOMBO.