

UNITED STATES PATENT OFFICE.

EUGENE SCHNEIDER, OF LE CREUSOT, FRANCE.

ALLOY FOR ARMOR-PLATES AND OTHER USES.

934,697.

Specification of Letters Patent. Patented Sept. 21, 1909.

No Drawing. Original application filed August 2, 1907, Serial No. 386,834. Divided and this application filed May 3, 1909. Serial No. 493,709.

To all whom it may concern:

Be it known that I, EUGENE SCHNEIDER, of Le Creusot, Saone et Loire, France, have invented a new and useful Improvement in
5 Alloys for Armor-Plates and other Uses, which invention is fully set forth in the following specification.

The cementation of armor plates has resulted in considerably increasing the resistance offered to projectiles relatively to that
10 obtaining with the homogeneous armor plates previously employed; so that recourse is now always had to cemented armor plates hardened by different processes, for the purpose of opposing the passage of projectiles
15 at high velocities and effecting their fracture by shock upon the impact face of such plates. Although presenting great resistance to uncapped projectiles, cemented armor plates offer but a relatively small resistance and one which is far from uniform
20 when they are attacked by capped projectiles; in this case they present little superiority over uncemented plates of equal thickness.

In a copending application filed August 2, 1907, Serial No. 386,834, (Patent No. 925,659, June 22, 1909) of which the present application is a division, I have described and
30 claimed alloys by means of which it is possible to form homogeneous armor plates giving results superior to those obtained with cemented plates.

The present invention relates to alloys of the class referred to and to particular alloys of said class. The homogeneous armor plates manufactured with these alloys present a more uniform resistance to the attack of uncapped projectiles and they also offer
40 greater resistance to capped projectiles than the best armor plates heretofore known.

The improved alloys are constituted in the following manner: A steel comprising, in addition to the iron, per hundred parts:

45 Carbon 0.30 to 0.50
Manganese less than 0.350
Nickel 3 to 5
Chromium 0.5 to 1.5

and while the metal is in fusion from 0.5 to

1.5% of molybdenum or 1 to 3% of tungsten, 50 or again, 0.2 to 0.5% of vanadium is added thereto.

Instead of adding one only of the metals indicated above to the steel separately, two may be added simultaneously; for example 55 molybdenum and tungsten together; or molybdenum and vanadium, or tungsten and vanadium. The three metals, tungsten, molybdenum and vanadium may also be added simultaneously. In these latter cases 60 the proportions of the metals added to the steel are reduced in a proportionate manner as regards each of them.

The composition of the steel, indicated above, is that which gives the best results in practice, but it is nevertheless capable of slight modifications. 65

The alloys constituted in the manner herein described present special properties due to their homogeneity and to the presence in 70 the initial steel of the molybdenum, tungsten or vanadium separately or combined in twos, or all three added together.

The presence of the molybdenum, tungsten or vanadium separately or combined 75 in twos or all three added together to the nickel and chromium in the steel, advantageously replaces the high percentage of carbon in the impact face of cemented armor plates, because it makes it possible by 80 any convenient process of tempering to obtain in regard to this face, a hardness sufficient to crush the projectiles and preserve all the desirable malleability in the metallic mass for avoiding cracking on firing. 85

With the alloys indicated above, homogeneous armor plates may be manufactured without any cementation or addition of special bodies to one face, while at the same time obtaining the proper qualities for resisting the attacks of capped and uncapped projectiles without cracking or scaling, in a more satisfactory manner than the armor plates hitherto known; this improvement is particularly noticeable in the case of the 95 capped projectiles which are employed in all navies.

Apart from the manufacture of armor

plates, the herein described alloys are capable of numerous uses precisely owing to their homogeneity and their great resistance.

What I claim is—

- 5 1. A steel alloy for armor plates containing in one hundred parts, in addition to iron, carbon 0.3 to 0.5, manganese less than 0.35, nickel 3 to 5, chromium 0.5 to 1.5, vanadium less than 0.5 and molybdenum less than 1.5.
- 10 2. A steel alloy for armor plates containing in one hundred parts, in addition to iron,

carbon 0.3 to 0.5, manganese less than 0.35, nickel 3 to 5, chromium 0.5 to 1.5, vanadium less than 0.5, molybdenum less than 1.5, and tungsten less than 3. 15

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EUGENE SCHNEIDER.

Witnesses:

DEAN B. MASON,
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