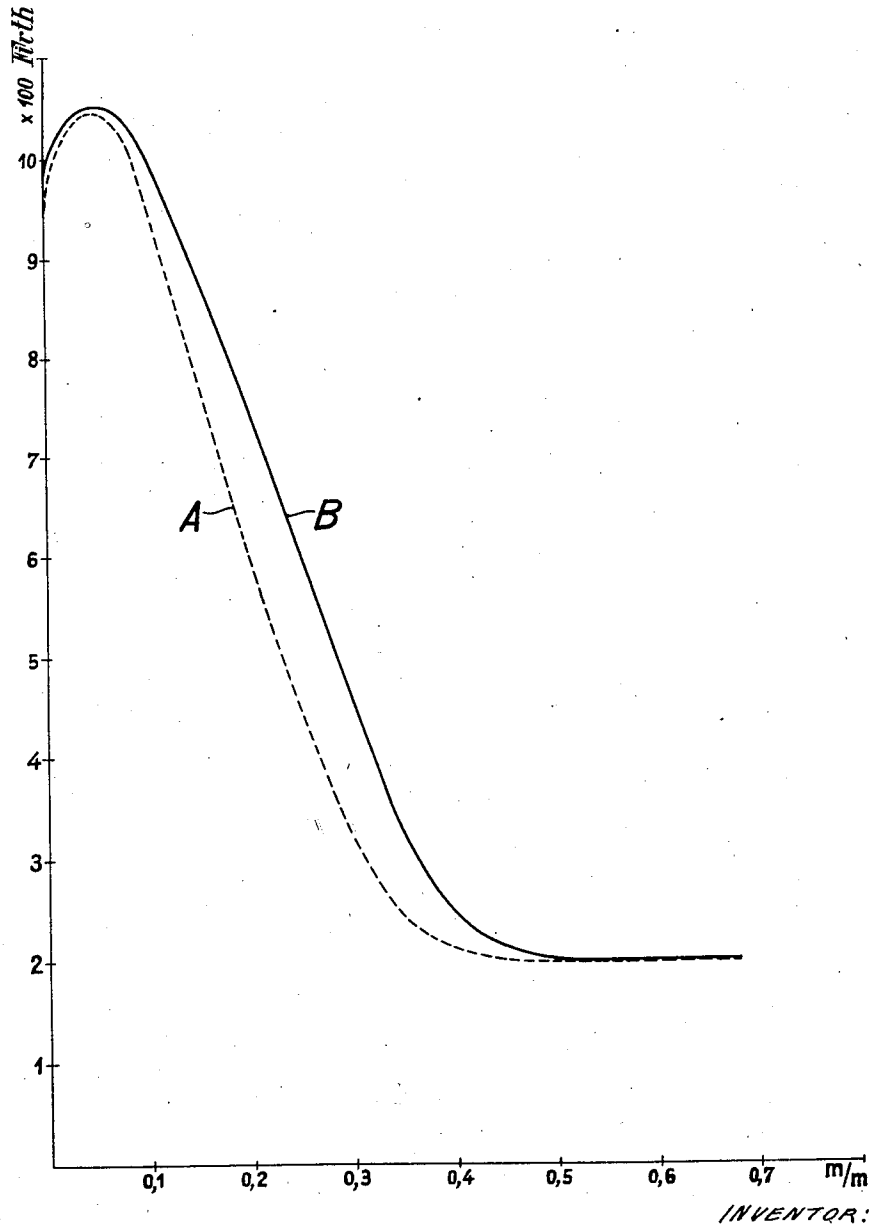
May 15, 1934. F. W. O. HENGSTENBERG 1,958,575

PROCESS FOR HARDENING IRON, STEEL, AND CAST IRON ALLOYS BY NITRIDING

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PROCESS FOR HARDENING IRON, STEEL, AND CAST IRON ALLOYS BY NITRIDING

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4 Claims. (Cl. 148—16)

This invention relates to processes for hardening iron, steel and cast iron alloys by nitriding and consists in carrying out the nitride hardening in the presence of one or more free or combined halogens. It has been found that by this means an increase in the hardness and in the depth of the hardened layer can be attained. Even in the presence of only small quantities of a halogen, either in the elementary or combined form, there is a noticeable increase in the effectiveness of the nitriding agent. Chlorine or a chlorine compound may particularly advantageously be used as the halogen or halogen compound.

In the drawing two hardness curves are shown of a steel containing 0.3% C, 0.2% Si, 0.3% Mn, 1.5% Cr and 1.2% Al. The ordinate represents the hardness values as measured by means of the Firth hardometer. The abscissa represents the depths in millimeters at which the measurements for hardness of the case and for penetration of the nitride hardness were taken. The curve A shows the course of the hardness of the steel when nitrided in the way usual hitherto at 500° C. for 48 hours in a stream of ammonia. The curve B is obtained when the steel is sprinkled with a layer of $CaCl_2$ about one mm. thick and then likewise nitrided for 48 hours at 500° C. in a stream of ammonia.

What I claim and desire to secure by Letters Patent is:—

1. The improvement in the hardening of ferrous articles by nitriding which consists in carrying on the nitriding treatment in the presence of a substance selected from the group comprising the halogens and halogen compounds, said substance being disposed in proximity to the zone of reaction in such form as to permit of free access of the nitriding agent to the article being nitrided.

2. The improvement in the hardening of ferrous articles by nitriding which consists in carrying on the nitriding treatment in the presence of a substance selected from the group comprising chlorine and chlorine compounds, said substance being disposed in proximity to the zone of reaction in such form as to permit of free access of the nitriding agent to the article being nitrided.

3. The improvement in the hardening of ferrous articles by nitriding which consists in carrying on the nitriding treatment in the presence of chlorine in a form permitting of free access of the nitriding agent to the article being nitrided.

4. The improvement in the hardening of various articles by nitriding which consists in carrying on the nitriding treatment in the presence of calcium chloride, said chloride being loosely disposed in finely divided and gas permeable form in proximity to and upon the article being nitrided and permitting free access of the nitriding agent to the article being nitrided.

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