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STRUCTURAL STEEL

No Drawing. Application filed January 3, 1931, Serial No. 506,505, and in Germany January 23, 1930.

The invention relates to the production of structural steel which can be subjected to great stresses and is intended for use more especially in the manufacture of profiled iron, bar iron, flat billets, sheet iron, and the like, which are employed in the construction of buildings on which great stresses are imposed.

The invention consists in an improvement of the steel according to the prior application Serial No. 345,601, which contains about 0.1 to 0.2 per cent of carbon and quantities of copper and chromium. This steel is characterized by a low A_3 point, a high elastic limit, and great tenacity. The following proportions produce a very good steel:—

0.1 to 0.2 per cent C.
0.25 to 1.5 per cent Cu.
0.25 to 0.5 per cent Cr.

A proportion of other alloys, such as nickel, tungsten, molybdenum, titanium and vanadium up to 1 per cent each may be incorporated.

The invention consists in an improvement in this steel; according to the invention part of the copper is replaced by the cheaper elements, manganese and silicon or one of these. It has been found that the same result is obtained with a steel whose copper content amounts only up to 0.6 per cent, as with a steel for which otherwise a higher copper content would be necessary, provided that the steel contains silicon and manganese in quantities up to about 1.5 to 2.2 per cent. If only one of the two elements is incorporated, it is advisable to increase the silicon content to about 0.7 per cent, while maintaining the manganese content normal. As an alternative the manganese content may be increased to about 1.5 per cent and the content of silicon left normal. The copper content is then preferably maintained at above 0.25 per cent. Particularly good results are secured with a copper content of between 0.5 and 0.6 per cent.

Thus two steels of the chemical composition mentioned below which were used in the form of an I iron gauge 40 showed the following physical properties:

Chemical composition of the steels

Steel	C	Si	Mn	P	S	Cu	Cr
1	0.18	0.65	0.90	0.03	0.02	0.40	0.40
2	0.16	0.76	0.95	0.03	0.02	0.55	0.35

Average physical properties

Steel	Yield point kg/mm²	Tensile strength kg/mm²	Expansion per cent	Contraction per cent
1	39	56	23	62
2	41	57	24	64

What I claim and desire to secure by Letters Patent of the United States is:

1. Steel of great tensile strength for use in the construction of buildings, which may be subjected to great stresses, which steel contains about 0.1–0.2% carbon, about 0.5–0.6% copper, about 0.25–0.5% chromium, silicon in amounts ranging from 0.05 to 1.0% and manganese from 0.6 to 1.5%, wherein the content of at least one of the two constituents silicon and manganese is above 0.6% and the sum of the contents of both of said constituents ranges between 0.8 and 2%, while the balance of the alloy consists substantially of iron.

2. Steel of great tensile strength for use in the construction of buildings, which may be subjected to great stresses, which steel contains about 0.1–0.2% carbon, about 0.5–0.6% copper, about 0.25–0.5% chromium, about 0.6–0.7% silicon and from about 0.6 to 0.8% manganese, while the balance of the alloy consists substantially of iron.

3. Steel of great tensile strength for use in the construction of buildings, which may be subjected to great stresses, which steel contains about 0.1–0.2% carbon, about 0.5–0.6% copper, about 0.25–0.5% chromium, about 0.6–0.7% silicon and from about 0.6 to 1.5% of manganese, while the balance of the alloy consists substantially of iron.

4. Steel of great tensile strength for use in the construction of buildings, which may be subjected to great stresses, said steel containing about 0.1–0.2% carbon, about 0.5–0.6% copper, about 0.25–0.5% chromium, about 0.8–1.5% manganese and about 0.05–0.6% silicon, while the balance of the alloy consists substantially of iron.

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