# United States Patent Office.

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## IMPROVEMENT IN PLATES AND BARS FOR CONSTRUCTION OF PLOWS, CULTIVATOR-TEETH, &c.

The Schedule referred to in these Letters Patent and making part of the same

*To all whom it may concern:*

Be it known that I, WILLIAM H. SINGER, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and improved Cast-Steel for the Construction of Plows and Cultivator-Teeth; and I do hereby declare the following to be a full, clear, and exact description of the same.

This invention consists of a certain improved cast-steel, when applied to the construction of plows and cultivator-teeth.

The said improvement lies in treating mild-tempered cast-steel, when formed into ingots or slabs in a converting-furnace, in such a manner as to carbonize the ingot from its surface inward to any depth that may be found preferable short of a complete carbonization, the central part of the ingot being left, in that case, comparatively soft or mild, and hence more tenacious than the surface.

The object of treating mild-tempered cast-steel in this manner is to obtain a material which may be hardened in its external carbonized portion to any required extent, and at the same time retain a mild and tenacious internal uncarbonized portion, such as will not crack.

Heretofore it has been found impracticable to harden ordinary cast-steel, such as has been used for the manufacture of plows and cultivator-teeth, owing to the fact that in hardening a great percentage of such steel warps or cracks, and is consequently rendered useless.

The steel herein described, however, does not crack in hardening, and consequently is peculiarly adapted to the construction of hardened plows and cultivator-teeth, superior to the ordinary softer articles, by reason of their greater durability.

To produce the slab of metal having the desired mild interior and hard exterior, I take an ingot of mild cast-steel, which has been produced in the ordinary manner, and place it in the converting furnace, allowing it to remain several days until carbonized to the depth required. It is then allowed to cool very gradually, and when finally taken from the furnace is rolled into plates of the required thickness for plow-shares, mold-boards, and cultivator-teeth.

This produces an article entirely different from and superior to those manufactured from iron treated in a similar way.

Having thus described my invention,

What I claim as new, and desire to secure by Letters Patent, is—

A plow-share, mold-board, or cultivator-tooth, when made of solid recarbonized cast-steel, whereby it has a mild center, substantially as hereinbefore described.

WILLIAM H. SINGER.

Witnesses:
ERASTUS AGNEW,
HENRY P. FORD.