UNITED STATES PATENT OFFICE.

GEORGE BANISTER, OF COLUMBUS, OHIO.

IMPROVEMENT IN PROCESSES FOR TEMPERING STEEL.

Specification forming part of Letters Patent No. **204,788**, dated June 11, 1878; application filed February 15, 1878.

To all whom it may concern:

Be it known that I, GEORGE BANISTER, of the city of Columbus, county of Franklin, and State of Ohio, have discovered and invented a new and useful Process for Tempering Steel, which process is fully set forth in the following specification:

The process consists, generally stated, in hardening and tempering steel at one operation by means of a metal bath, as hereinafter described.

The process is applied to steel forgings, such as springs and cutting and other tools, but is particularly suitable and efficacious in the case of the former—to wit, springs.

In practicing my process, I first heat the springs or tools to a cherry red, and then immerse them in a metal bath—namely, a bath of melted lead and tin—and allow them to remain therein for a short time. It matters not if they remain a long time—say several hours—since the effect is the same as it would be if they remain a short time—say a few seconds. It is only necessary that they shall not, in most cases at least, be instantly withdrawn from the bath.

Springs for various uses require a lower temper than most, if not all, other articles, and edge-tools require a comparatively high one. To harden and temper springs, the bath of melted tin and lead must have a high degree of heat; but for edge-tools the bath requires to be heated to a less degree, the principle being that the lower the temper the higher the heat required, and, vice versa, the higher the temperature the lower must be the temper.

The temperature of the metal bath may be determined and regulated by means of any suitable instrument; but I find that in practice none is requisite, since the judgment of the workman enables him to readily ascertain the temperature. The temperature of the bath, in fact, requires to be the same as in the usual process of hardening metals preparatory to drawing the temper, or softening them by subsequent application of heat.

I am aware steel has been hardened and tempered at once by heating it and plunging it into a bath of water or oil; and, furthermore, that metal baths, both lead and tin, and their alloys, have been used as hardening-baths previously to tempering and as tempering-baths subsequent to hardening.

The advantages I claim for my invention are: First, it will impart to steel implements a more uniform and better temper; second, it saves the loss now occasioned by steel implements warping and cracking in the process of hardening; third, steel tempered by this process, after it leaves the metal bath, is more pliable, and any defects in shape can be more easily corrected, than in steel tempered by the old process; fourth, this process saves time and the expense of keeping up a bath for the purpose of hardening the steel before it is tempered.

What I claim as my invention is—

The process of hardening and tempering steel at one operation, which consists in heating it to the degree required for hardening by ordinary methods, and immersing it while so heated in a molten-metal bath, and retaining it therein, substantially as set forth.

GEORGE BANISTER.

Witnesses:
WILLIE H. TULLER,
ANDREW L. RALSTON.