

UNITED STATES PATENT OFFICE.

JOHN COFFIN, OF JOHNSTOWN, PENNSYLVANIA, ASSIGNOR TO THE CAMBRIA
IRON COMPANY, OF SAME PLACE.

PROCESS OF TOUGHENING FORGED ARTICLES OF STEEL.

SPECIFICATION forming part of Letters Patent No. 401,010, dated April 9, 1889.

Application filed February 8, 1888. Serial No. 263,327. (No specimens.)

To all whom it may concern:

Be it known that I, JOHN COFFIN, of Johnstown, in the county of Cambria and State of Pennsylvania, have invented certain new and
5 useful Improvements in the Process of Toughening Forged Articles of Steel; and I do hereby declare the following to be a full, clear, and exact description of the invention, such
10 as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improved process for toughening forged articles of steel.

In Patent No. 368,132, granted to me and
15 dated August 9, 1887, I have described a means of toughening railroad rails or other steel bars, which consist in partially cooling the rails or bars after they have passed
20 through the usual breaking-down and finishing rolls in process of manufacture by subjecting the rails or bars while still very hot to immersion in a water bath and spraying
25 jets of water on the head of the rail, said rail being removed from the water having sufficient contained heat to present a dull red color in the dark, the rail being allowed to cool gradually and thus finish the operation. When rails or steel bars were thus handled,
30 the structural arrangement of their mass remained amorphous or devoid of crystallization, this condition resulting from the kneading and stretching to which the faggot is subjected by the drawing of the same successively through a train of rolls endwise.

It was considered at the time my application for patent on the method of toughening steel rails or other bars was filed that a good structural condition of the mass of steel undergoing manipulation could only result
40 from drawing the same by successive passes through the train of rolls of the rolling-mill or an endwise movement of the bar or rail between said rolls. It has since become apparent that modern methods of machine-forging steel by drop-hammer action or other apparatus that forges steel without an endwise
45 movement through rolls will leave it in good structural condition, which may be maintained if a suitable process is employed to retain such a disposition of its atoms as to prevent crystallization.

The object of my present invention is to provide a process for the handling and cooling of steel forgings, so as to avoid a weak structural arrangement of their molecules that
55 would result if they were allowed to cool gradually in the atmosphere.

To this end my process of toughening steel articles that have been forged by an approved apparatus in contradistinction to the
60 endwise passage of such articles successively through a train of rolls consists in the immersion of the article bodily in a bath of water to partially cool it after it has been finished at the forging-machine, then removing it from
65 the bath while it has sufficient heat in its mass to show a low red color in the dark, by subsequent diffusion of the heat throughout its body and afterward allowing the partially-cooled forged article to gradually become completely cold from contact with the atmosphere.

I do not restrict myself to the narrow meaning of a bath of water, as a bath of any other cooling-liquid could be used; or the bath may
75 be agitated by jets or other means, or a spray bath may be used consisting of jets alone without any solid liquid portion such as would be contained in a bosh; but,

Having fully described my process for
80 toughening steel articles that have been forged by any proper method other than rolling endwise, what I claim as new, and desire to secure by Letters Patent, is—

The within-described process of toughen-
85 ing steel articles that have been forged, consisting in first forging the article, then immediately subjecting it to the cooling action of a bath of water or other cooling mixture or medium to partially cool its mass, and
90 finally removing the article from the bath while it has sufficient contained heat in its body to show after diffusion a low red color in the dark.

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

JOHN COFFIN.

Witnesses:

E. J. BURKHART,
C. M. BRENISER.