

G. W. BILLINGS.
Treating Bessemer Steel and other Metals to Anneal
them for Punching, &c.
No. 140,759. Patented July 15, 1873.

Fig 1.

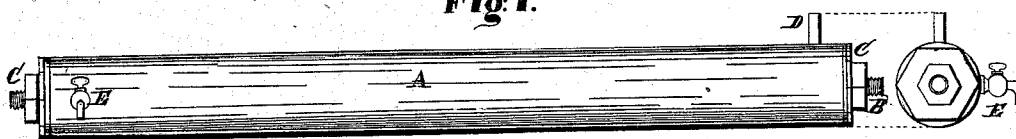


Fig 2.



Witnesses.
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GEORGE W. BILLINGS, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN TREATING BESSEMER STEEL AND OTHER METALS TO ANNEAL THEM FOR PUNCHING, &c.

Specification forming part of Letters Patent No. **140,759**, dated July 15, 1873; application filed June 25, 1873.

To all whom it may concern:

Be it known that I, GEORGE W. BILLINGS, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Process of Working Bessemer and other Steel and Iron, of which the following is a description, reference being had to the accompanying drawings making a part of the specification, in which—

Figure 1 is an outside view of a device for conducting the process. Fig. 2 is a transverse longitudinal section.

Like letters of reference refer to like parts in the several views.

The nature of this improvement relates to the employment of steam by any suitable appliances for the purpose of rendering more amiable Bessemer steel and other steels and iron so that such metals may be punched, drilled, upset, swaged, &c., for the various purposes required in the arts and manufactures.

It is well known that in punching steel railway rails that the bar is severely strained thereby, causing fracture at the time or subsequently when in use at the place where the perforation is made. In the manufacture of wood-screws of steel, also of bolts, the head by swaging and upsetting becomes severely strained, causing the dies and punches used in forming such heads and punching rails to be soon broken or worn out. This is also the case of carriage steel springs. When steel is annealed in a furnace the entire article is generally subject to this heat, though a part only of the article requires annealing. A consequence of annealing by furnace-heat is the oxidation of the surface of the metal and a disturbance of the molecular arrangement ensues; hence it is found that the furnace-heat for annealing degrades the character of the metal so far as its elasticity and tenacious elements are concerned. This is more obvious in steel for springs and other analogous purposes.

To avoid the oxidation of the metal by furnace-heat and change in its character, and at the same time render it amiable so as to be conveniently and easily worked, I cause a jet of steam—say, about 300°, more or less, according to the nature of the steel—to be impinged

upon the point or place to be punched or swaged without heating the entire article, as must be the case when the article is subjected to furnace-heat. The employment of steam for rendering steel and iron more pliable in working acts also as a lubricator on the dies, punches, and other tools.

The hard and intractable character of many kinds of steel is well known to be a serious objection to working it when in a cold state; but by the action of steam a plate or bar can be perforated or punched at any point of its surface by the application of steam to the punch and metal at such point, thereby avoiding the necessity of heating the whole mass. Thus a boiler or spring plate or bar of steel may be annealed at any one point or place, and then punched without straining the metal, which would not be the case if not rendered pliable. At the same time it is much more convenient and easy to manipulate, and with less labor and expense, than when softened in a furnace in the ordinary way; also, the metal is not impaired in quality by the use of steam, whereas it is by the action of the gases from the furnace or fire used for annealing.

In making steel screws, rivets, and bolts, I cause the wire or rod to pass through a chamber or cylinder heated by steam to such a degree as will render it pliable for working, and as one example for such purpose I refer to the annexed drawings, in which—

A, Fig. 1, represents an outside view of cylinder or steam-chamber, through the center of which passes a tube, B, Fig. 2. Said tube is secured in each end of the cylinder in a steam-tight manner by heads C. The ends of the tube are open to the outside; so, also, is the cylinder, by means of the induction-pipe D and stop-cock E.

This device is especially intended to anneal wire and rods used for the manufacture of wood screws, bolts, and rivets, and which device is used in connection with the machines for making such articles. The wire or rod, immediately before entering the machines, is run through the tube B, which, by the induction of steam into the cylinder through the pipe D, heats the tube and the wire or rod therein to a degree that renders it much

softer, and hence more easily worked without effecting its tensile strength by oxidation or its molecular arrangement. By this device the metal is not brought into direct contact with the steam.

In the use of a furnace for annealing purposes it is a difficult matter to keep the heat at a steady and uniform degree. A variable degree of heat produces a variable degree in the annealing; hence without the utmost care being exercised in keeping the fire at the same degree of heat, the annealing is uncertain, some of the metal being soft and some not so soft. This seriously interferes with the working of the metal when a uniformity of softness and pliability is needed, as in the manufacture of wood screws, &c.

By the use of steam for annealing a uniformity in the degree of the result can be relied on, as the steam is of a uniform degree of heat;

hence will result a uniformity in the degree of annealing without the exercise of special care.

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

1. The herein-described application, in the process of annealing steel and iron, of the use of steam, applied either directly to the article or by heating the same by placing it in a heater heated by steam, substantially as set forth.

2. The herein-described apparatus for annealing steel wire, &c., consisting of the cylinder A, tube B, and chamber, substantially in the manner as described, and for the purpose specified.

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Witnesses:

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