

(No Model.)

W. B. CARGILL.

HARDENING AND TREATING STEEL.

No. 249,222.

Patented Nov. 8, 1881.

Fig. 1.

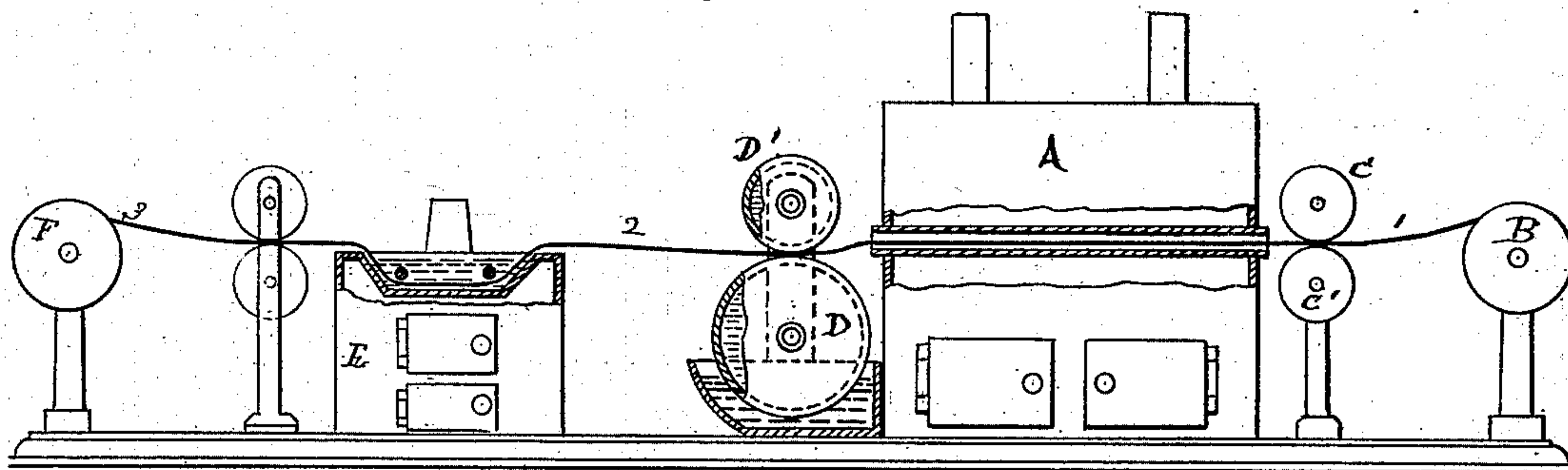


Fig. 2.

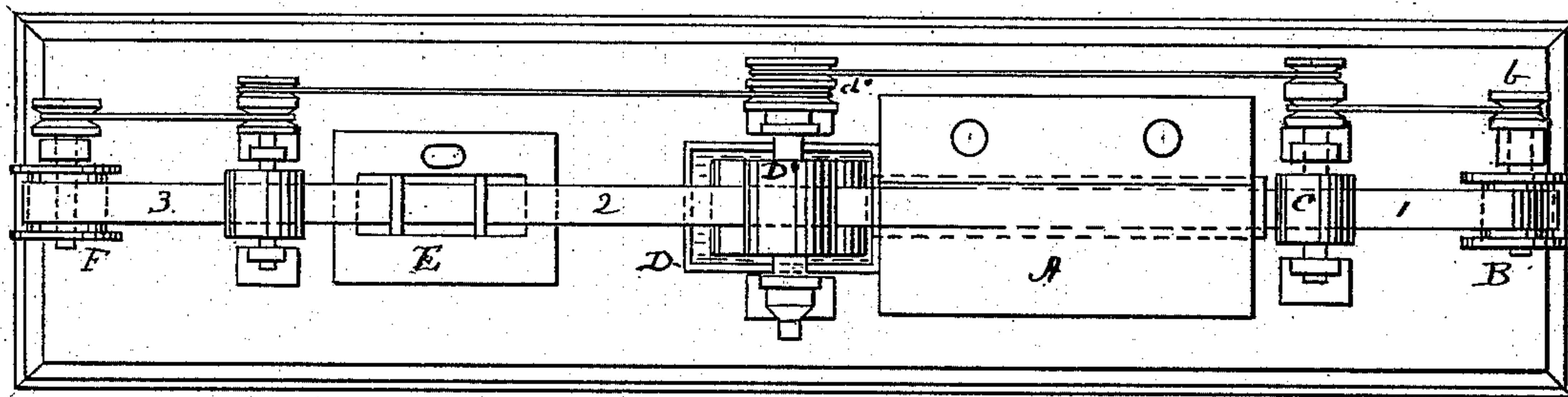
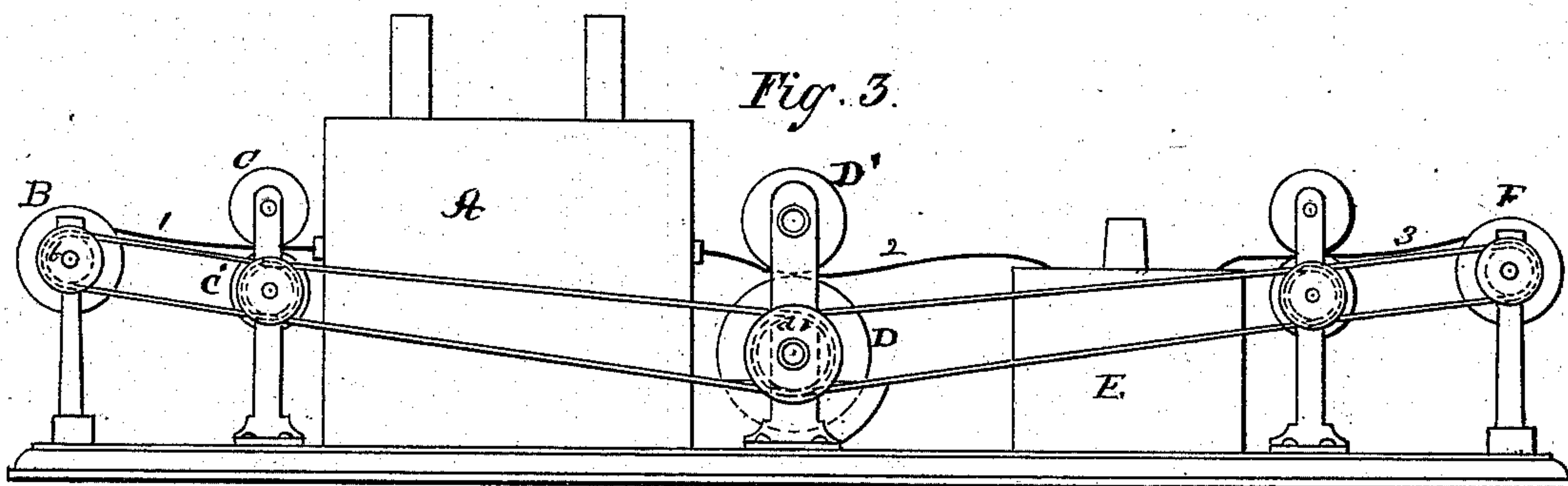


Fig. 3.



Witnesses.

J. Battus
Eugene Banta

Inventor.

Wm. B. Cargill
by J. B. Staples
his Atty,

UNITED STATES PATENT OFFICE.

WILLIAM B. CARGILL, OF WATERBURY, CONNECTICUT.

HARDENING AND TREATING STEEL.

SPECIFICATION forming part of Letters Patent No. 249,222, dated November 8, 1881.

Application filed July 21, 1880. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. CARGILL, of Waterbury, in the county of New Haven, State of Connecticut, have invented a new and useful method of hardening steel wire or steel in thin strips and in the treatment of the same simultaneously with such hardening, of which the following is a specification.

The nature of my invention consists, first, in a method of hardening steel wire or thin strips of steel by passing them, in a heated state, directly between revolving surfaces chilled from within and in contact with the same; and, secondly, in subjecting the wire or thin strips, in a heated state, to contact with revolving surfaces chilled from within, and at the same time covering one of the revolving chilled surfaces with a thin film of oil.

In practicing my method and invention in the hardening of steel, I use the apparatus and machinery hereinafter particularly described, and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation. Fig. 2 is a top view; and Fig. 3 is a side elevation opposite to that in Fig. 1.

In all the figures similar letters represent similar parts.

The drawings also represent a tempering apparatus in connection with my method of hardening; but the manner of tempering the steel strips after they are hardened is well known.

A furnace, A, for heating the steel, is constructed of a long and narrow form, having a grating and ash and air chambers underneath, so as to regulate the intensity of the heat, as desired.

In line with and in rear of the furnace is placed the revolving reel or drum B, having its axis extended so as to receive thereon the gearing-pulley *b*. Upon this reel B the wire or strips of steel are wound, of any desired length or width. The steel strip is shown in the drawings from one end of the operation to the other at 1 2 3.

Between the furnace and the reel B, I place the pair of drums C C', placed one above the other. Between these the steel is passed; and by means of a gearing-pulley on the end of the axis of one of said drums the steel may be

pushed through the furnace, and thence between the hardening cylinders, so as to avoid any tension or strain whatever upon the heated steel, from friction or other causes, before or after it is hardened.

D D' are two hollow cylinders of cast metal, for hardening the steel, revolving in suitable bearings in the two parallel standards *d d*. The gudgeons of these cylinders are hollow. The cylinders are arranged one above the other, so that their surfaces will touch and press upon the steel as it passes between them. The lower cylinder is made of a diameter slightly greater than that of the upper one, and one of the gudgeons of the lower cylinder is extended so as to carry a gearing-pulley, *d'*, by which the two cylinders D D' are made to revolve. The steel passes out of the furnace through an aperture or tube at such a height as to carry the steel in a straight line between the two hardening-cylinders, and the cylinders are placed as close to the end of the furnace as possible, in order that the steel may not cool after it leaves the furnace and before it reaches the hardening-cylinders. Into each of the hardening-cylinders cold water is introduced through one gudgeon continuously, and passes out through the opposite gudgeon during the operation. Under the lower cylinder is placed a vessel containing oil, and into which oil the lower part of the cylinder dips. The steel, after passing between the hardening-cylinders, is conducted in a straight line to a tempering vat and furnace, E, and underneath the surface of the melted lead, or other suitable mixture of melted metal, kept in a hot and fused state by the heat from the furnace underneath; thence it passes between two guiding-pulleys, one of which has its axis lengthened, upon which is fixed a gearing-wheel, and thence the steel passes to the winding reel or drum F, and during the whole passage of the steel through the furnace to the winding-reel F there is no tension or strain upon the heated steel, which tension I avoid, as I have found by long experience it is injurious to the thin strips of steel in many cases and useless in all cases. The steel strips will not crinkle or twist after being hardened and treated according to my invention and improvements herein set forth.

The hardening of the steel is produced by the surfaces of the hot steel coming into contact with the cold surfaces of the hardening-cylinders D D', by which contact it is instantly and completely hardened, and any curve in the cross-section of the flat steel is completely straightened. Simultaneously, or following the hardening, the lower hardening-cylinder, revolving, brings up on its surface a thin film of oil, which, immediately coming in contact with the hardened steel, toughens it, and prevents any undue brittleness which the coldness of the cylinder-surfaces might produce upon the steel, and at the same time leaves smooth the surface of the steel and prevents any scale.

The hardening of steel in a heated state in thin strips or as wire, by means of plunging the steel, while hot, into oil or other suitable liquid, or by drawing it between flat surfaces of metal kept cold by water thereon, the steel being drawn, under tension, through the furnace and through the hardening mediums, is an old and well-known operation, and I do not claim as my invention any part thereof.

Having thus described my invention and improvements and the manner of constructing and using the same, what I desire to secure by Letters Patent is—

1. The method of hardening steel in strips which consists in heating the steel and immediately conducting it between and in contact with the revolving surfaces chilled from the inside, substantially as and for the purposes set forth.

2. The method of hardening and treating steel which consists in heating the same and immediately conducting the same between and in contact with revolving surfaces chilled from the inside, and at the same time covering one of the revolving chilling-surfaces with a film of oil, substantially as and for the purposes set forth.

WILLIAM B. CARGILL.

Witnesses:

CHAS. N. GILLETTE,
GEO. E. SOMERS.