

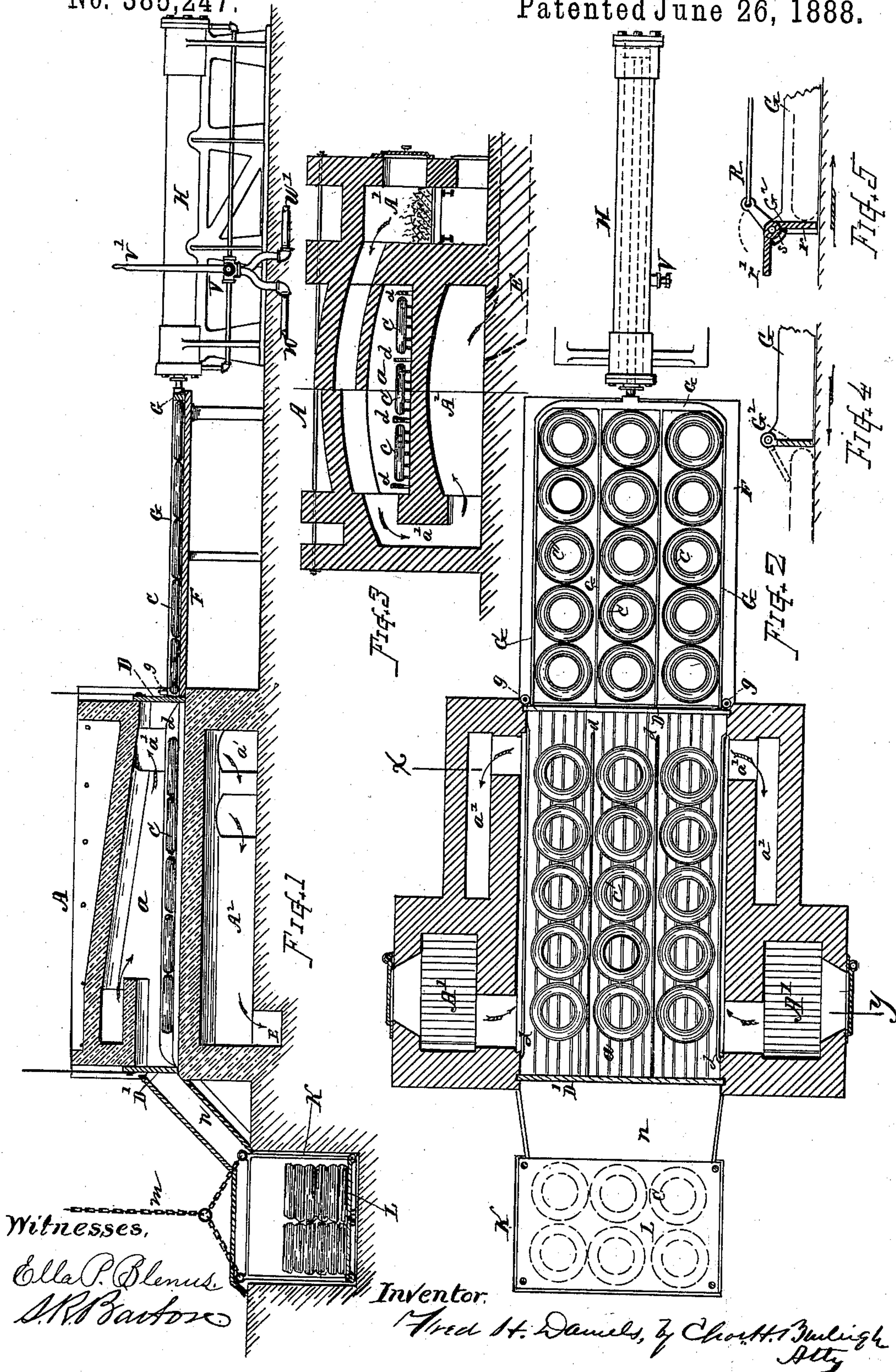
(No Model.)

F. H. DANIELS.

APPARATUS FOR ANNEALING WIRE.

No. 385,247.

Patented June 26, 1888.



UNITED STATES PATENT OFFICE.

FRED H. DANIELS, OF WORCESTER, MASSACHUSETTS.

APPARATUS FOR ANNEALING WIRE.

SPECIFICATION forming part of Letters Patent No. 385,247, dated June 26, 1888.

Application filed December 4, 1886. Serial No. 220,656. (No model.)

To all whom it may concern:

Be it known that I, FRED H. DANIELS, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Annealing Wire, of which the following, together with the accompanying drawings, is a specification sufficiently full, clear, and exact to enable persons skilled in the art to which this invention appertains to make and use the same.

The object of my present invention is to provide a method and means for the economical and convenient annealing of wire during the process of manufacture and for advancing or transferring the wire coils with facility and dispatch; also, to provide a suitable furnace or muffle through which coils of wire can be passed, for heating the wire, and facilities for receiving the heated coils as they are ejected from the furnace and inclosing them for slow cooling action; also, to provide a practical and efficient mechanism whereby coils of wire can be charged into the annealing-furnace and the contents of the furnace discharged; also, to provide means in the annealing-furnace for separating rows of wire coils and confining the several series of coils to their respective lines of advancement. These objects I attain by mechanism the nature of which is illustrated in the drawings hereinafter explained, the particular subject-matter claimed being hereinafter definitely specified.

In the drawings, Figure 1 is a vertical longitudinal sectional view of an apparatus for annealing wire in accordance with my invention. Fig. 2 is a plan view of the same. Fig. 3 is a vertical section, one half at line *x* and the other half at line *y* in Fig. 2. Fig. 4 is a sectional view illustrating a swinging gate for use, when required, on the end of the charger-frame; and Fig. 5 is a similar section showing a double gate which can beset for working the coils in either direction.

In referring to parts, A denotes the furnace or muffle, having a chamber, *a*, wherein the coils of wire C are subjected to the annealing-heat. Said furnace is, in the present instance, shown provided with fire-chambers A', opening into the chamber *a*, and with passages *a'*, leading to the chamber A', beneath the

hearth of the furnace, through which passages and chamber the products of combustion pass to the exit or chimney flue E.

If preferred, instead of making the furnace with fire-chambers A', said furnace may be constructed to be fired with gas on the Siemens regenerative plan, which plan, being well known, need not be herein illustrated and described.

The furnace is provided with doors D and D' at its respective ends for entering and discharging the product, and the bottom or hearth of the furnace is provided with a series of longitudinal bars, upon which the coils of wire C are supported in a manner to allow the heat to readily pass around them.

The capacity of the furnace is preferably such as to admit three or more coils of wire abreast of each other laterally, and guide-bars *d* or fenders are arranged through the furnace longitudinally to separate and confine the several series of coils to their respective lines of advancement as they pass from one end of the furnace to the other.

F indicates a feed table or platform of a size substantially corresponding with the area of the furnace-hearth, and arranged in front of the entrance-door D at or slightly above the level of the support-bars or floor of the heating-chamber.

G indicates a charging-frame made in the shape of a fork, with side and intermediate guide-bars extending forward from the cross-head along the surface of the table F, and adapted to be projected forward into and withdrawn from the furnace by means of the piston of the hydraulic cylinder H, the piston-rod being connected to the cross-head of the frame G, water under pressure being supplied and discharged to and from the cylinder through the pipes W W', controlled by the valve V, operated by the hand-lever V', or in any other suitable manner. The forks of the frame G are preferably made of thin bars of iron some four to six inches wide, more or less, and one-half inch (more or less) in thickness, arranged vertical or on edge and adapted to pass into the furnace alongside the fender-bars *d*. The bars of the frame G are disposed at such distance apart laterally as will form compartments substantially corresponding to the di-

ameter of the coils of wire, which coils are placed in the spaces between said bars when the charger-frame is out upon the platform F, and are there confined and guided by said bars as they are advanced from the platform into the furnace by the forward movement of the charger-frame, so as to be left on the receiving-bed in regular order and series, when the charger-frame is withdrawn from the chamber of the furnace. The bars or forks of the charging-frame G may in some instances be made open or unconnected at their front ends, so that their ends can pass freely between the coils or the coils between the ends as the frame is reciprocated; or, if it is desired that the end of the frame should serve to force forward the coils of the previous charge which are within the furnace, or for ejecting or discharging them from the furnace, then the ends of the bars or forks are best connected or provided with a swinging gate or gates, as at G², Fig. 4, said gate being arranged to swing against a lug or stop and maintain a vertical position when the charger-frame is moving forward or in one direction, and then to swing up (as indicated by dotted lines) and pass over the coils without moving them when the charger-frame is retracted or moved in the other direction, so as to leave the coils deposited in proper order and position within the furnace. Guards or guide-rolls *g g* are preferably arranged at the sides of the doorway, as indicated, for directing the frame G at the entrance of the furnace.

K indicates an inclosed cooling-chamber or equalizing-pit for receiving the heated wire as it is ejected or discharged from the annealing-furnace. Within said pit I prefer to arrange a box or cage having a platform or support, L, upon which the coils are piled, and said cage or platform is provided with facilities for attaching it to the chain *m* of a crane or hoisting mechanism, whereby the platform or cage, together with its load of wire, can be raised and transferred to such place as desired. The chamber K may be provided with a door or cover for shutting in the wire. *n* indicates an inclined guide or pass way from the exit-door D' of the furnace to the receiving pit or chamber K.

The general practice of inclosing wire within a chamber for gradual cooling, after it has been heated, is well known and common, and of course is not claimed by me; but an apparatus arranged for accomplishing the heating, transfer, and inclosure of the coiled wire, as herein set forth, is a novel and convenient improvement of great practical utility, and is a feature of my invention.

In some instances conditions of location may render it desirable to withdraw the coils from the furnaces at the same door at which they are entered. In such cases the charging-frame may be provided with double gates, as indicated in Fig. 5, so that one portion, *r*, of the gates will act to move the coils of wire when the frame is moving backward or in the di-

rection as indicated by the arrow, and the other gate, *r'*, will act when moving the frame in the opposite direction, a connection, R, being attached to an arm or lifting-lever provided with a lug, *s*, for changing the position of the gates to bring the gate *r* or *r'* into position for action as required. The gates are separated into lengths, so as to pass the fender-bars *d* without interfering therewith, and are best made sufficiently narrow to enter the coils.

In the operation of my apparatus the coils of wire C to be annealed are laid upon the table F between the forks of the frame G, as indicated. The doors D D' of the furnace at the proper moment are opened, and the hydraulic pressure is let onto the outer end of the cylinder H, thereby advancing the piston and projecting the fork or frame G into the furnace. This movement slides the series of coils from the table into the furnace, and at the same time ejects the series of coils which were formerly in the furnace out through the door D' and into the receiving chamber or pit K. The valve V, being then shifted, reverses the action of the piston and withdraws the frame G, leaving the coils within the furnace, the frame returning to its original position upon the table for receiving another charge. The doors of the furnace are then closed until the heating of the wire has progressed to the desired degree, when the operation is repeated, the charging-frame and table having in the meantime been supplied with a fresh relay of coils for the ensuing charge.

The coils as they are ejected from the furnace may be arranged in any desired order within the receiving-chamber by means of a hook or tongs in the hands of an attendant.

If desired, the platform F and hearth of the furnace may be inclined instead of horizontal, to facilitate the easy sliding movement of the coils thereon.

The furnace-charger G is herein shown of a size and form to receive and advance three series of coils with five coils in each series; but I do not desire to confine my invention to a size and shape for any particular number of coils or any number of series of coils, as said charging device may be made so as to receive, advance, and deposit within the furnace any number (more or less) of coils simultaneously, as may be desired, according to the convenience of the works or size of the furnace or other conditions which may occur in practice, and in similar manner said charging device may be constructed, proportioned, and arranged for ejecting, discharging, or withdrawing a greater or less number of coils at a time or with a single movement of the frame or charger.

The guide or way *n* may be inclosed or provided with a cover to protect the heated wire from the scale-producing action of the surrounding atmosphere as the coils are passed from the interior of the furnace to the cooling-chamber K.

I am aware that a furnace for heating ingots

and blooms has heretofore been patented wherein the blooms are forced into the furnace by a reciprocating piston and the blooms within the furnace pressed forward by those subsequently entered. The construction and operation of such mechanism are, however, essentially different from that herein claimed, as it is not provided with means for lateral confinement of the charge and its charging-frame does not enter the furnace and is not adapted for receiving, carrying, and depositing wire coils. Neither is the product discharged or ejected from the furnace by the action of the charging devices, as hereinbefore described. I am also aware that in certain branches of the arts endless bands have been employed for conveying material to be treated into ovens and furnaces. I do not therefore include such apparatus as within the scope of the invention herein claimed.

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

1. A furnace-charging device for wire in coils, having a reciprocating movable frame provided with guide-bars between which to receive, carry, and deposit wire in coils upon the receiving bed or hearth of a furnace, and means, substantially as described, for advancing and retracting said frame into and from the furnace, as hereinbefore set forth.

2. A furnace-charging device for wire in coils, consisting of a platform or supporting-way in front of the furnace, a movable frame having guards between which to receive, carry, and deposit the wire coils upon the furnace-bed, and an operating-motor, substantially as described, for advancing and retracting said frame into and from the furnace-chamber, as hereinbefore set forth.

3. In a charging and discharging mechanism for handling wire in coils, the combination of a platform or way, a movable frame having compartments for receiving, supporting, and transferring wire in coils, an operating-motor for reciprocating said frame along the way to and from the annealing-bed, and a swing-gate across said compartments for engaging the coils, substantially as set forth.

4. In an annealing plant for wire, the combination, with a heating-chamber and a charging-frame adapted to receive, advance, and deposit coils of wire, of guiding devices disposed at the entrance of the furnace, as at *g*, for maintaining proper alignment of the charging-frame in its advance movement into said heating and annealing chamber.

5. In an annealing plant for wire in coils, the combination, with the heating-chamber and feed-platform, of a charging or discharging frame having intermediate forks or guide-bars, substantially as set forth, whereby said frame is adapted to maintain separate two or more series of coils of wire when projecting them into or withdrawing them from said heating-chamber, substantially as set forth.

6. The apparatus for annealing wire, consisting of the annealing-furnace having entrance and exit openings or doors at its respective ends, a feed-table, a reciprocating charging-frame having compartments for supporting coils of wire while transferring them from said table to the interior of said furnace, and a cooling or equalizing chamber into which the coils of wire are projected from the furnace by the action of entering the succeeding charge, substantially as set forth.

7. In an annealing apparatus for wire, the combination of the furnace adapted for heating wire in coils, the coiling-chamber into which the coils of wire are ejected from said furnace, a covered guideway for the coils between said furnace and chamber, and a mechanically-operated ejector or charger, substantially as hereinbefore set forth.

8. The combination, with the heating-chamber in an annealing-furnace adapted for heating wire in coils, of a series of longitudinal fender-bars that separate and confine the coils of wire to their respective lines of advancement in series, substantially as set forth.

9. The combination of a furnace, its heating-chamber having inlet and exit doors at its respective ends, a series of longitudinal fenders for separating series of coils, a reciprocating charging-frame having longitudinal bars for confining and moving forward a plurality of series of coils of wire, and an operating-motor connected with said frame for advancing and retracting it into and from the furnace, substantially as set forth.

10. An apparatus for annealing wire having a furnace adapted for heating wire in coils and a receiving pit or chamber into which the heated coils pass as they are ejected from the furnace, with a removable platform or cage within said receiving-chamber, onto which the coils are deposited and by means of which the contents of the chamber can be discharged, substantially as set forth.

11. In combination with an annealing-furnace, the charging-frame having the longitudinal bars, and the swinging gates disposed transversely on said bars for engaging with and effecting transfer of wire in coils to or from said furnace, substantially as set forth.

12. The combination, with an annealing-furnace and a reciprocating furcated charging-frame having bars for confining coils of wire in series, of a swinging gate having forwardly and backwardly engaging parts, as *r* and *r'*, and a connection for operating said gate, substantially as set forth.

Witness my hand this 30th day of November, A. D. 1886.

FRED H. DANIELS.

Witnesses:

CHAS. H. BURLEIGH,
ELLA P. BLENUS.