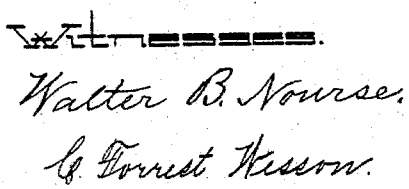


C. W. BILDT.
ANNEALING APPARATUS.

Patented Mar. 6, 1894.



INVENTOR.
Carl Wilhelm Bildt.

By *A. A. Barker* Att'y

UNITED STATES PATENT OFFICE.

CARL WILHELM BILDT, OF WORCESTER, MASSACHUSETTS.

ANNEALING APPARATUS.

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To all whom it may concern:

Be it known that I, CARL WILHELM BILDT, of the city and county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Annealing Apparatuses; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 represents a vertical, longitudinal section, partly in elevation, of a wire-rod annealing apparatus embodying my improvements, taken at the point indicated by line *a* in Fig. 2. Fig. 1' is a detailed view of a part thereof hereinafter more fully described. Fig. 2 is a vertical, transverse section of the apparatus taken at the point indicated by line *b* in Fig. 1, looking in the direction of arrow *b'*. Fig. 3 is a transverse or cross-section through the annealing pot, and the longitudinal coil-supporting rods, therein, taken on line *c* looking in the direction of arrow *c'*, Fig. 1. Figs. 4 and 5 are similar cross-sections of the annealing pot showing, in Fig. 4 a large wire-rod coil, placed over all the aforesaid longitudinal rods, and in Fig. 5 smaller coils over each of said rods, and Figs. 6 and 7 are transverse sections taken on lines *d* and *e* respectively.

My invention relates more especially to apparatuses for annealing what are commonly known as wire-rods and wire while in a coil, and consists in combining with an annealing furnace a horizontal removable, rotating annealing pot, having suitable means for slowly turning the same, and provided with a series of longitudinal rods arranged within the pot for supporting the coils so that an independent rotary motion may be imparted thereto when said annealing pot is rotated during the annealing process, as and for the purposes hereinafter more fully set forth.

As is well known, much time and study have been expended in efforts to produce wire free from what are technically termed "spots," or unevenly annealed places in said wire, which I find have been caused by uneven heating or cooling of the material; especially when the wire is annealed in pots. Said "spots" when caused by annealing, occur regularly at

certain intervals, for the reason that one part of the coil has been exposed to a higher temperature than another. In the way pot annealing is, and has been done, it is not possible to obtain a thoroughly uniform product. The wire will be more or less "spotted," or in other words, unevenly annealed—the texture of the material being much more hard and brittle at one point than another, and thus resulting in an inferior finished product. To remove this objection is the main purpose of my invention. By the application thereof to practice, the wire rods or wire may be annealed alike at all points, therefore resulting in a thoroughly uniform product free from "spots."

Following is a more detailed description of my invention, with reference to the accompanying drawings.

In said drawings A represents a furnace provided with the usual grates B and smoke-flue C. The top A' of said furnace, is preferably made circular in form as shown in Fig. 2, and is removable, the same resting at the points *ff* on the walls of the furnace when fitted thereon, as shown in the drawings. Said top or cover A' may in practice be removed or lifted from the walls of the furnace for the purpose hereinafter described, by means of a hydraulic crane, or other suitable power connected with the eyes *gg* formed upon or secured to the top of said cover. As said lifting mechanism constitutes no part of my invention it will be unnecessary to illustrate or describe the same. Within the furnace and above the grates B is arranged horizontally a removable, rotary, annealing pot D having trunnions D' D' at each end fitted to turn in suitable stationary bearings E E. The driving power for turning said annealing pot is connected with one of its trunnion ends in such a manner as to be easily disconnected therefrom, to permit the removal of the pot after each annealing operation. In this instance I have adopted the following well-known construction to accomplish said result. Between the end of the trunnion and the end of the drive-shaft F in alignment with said trunnion and shaft, is arranged a short fluted shaft G, the ends of both the trunnion and drive-shaft being also

correspondingly fluted for a short distance, or up to the collars *h h* formed on the said ends. Inside of said collars the trunnion and shaft are made smooth to turn in their respective bearings. In this instance, only a short drive-shaft *F* is shown, the same being fitted to turn in suitable stationary bearings *H H*, and having the drive-pulley *I* secured thereto between said bearings. Over the fluted parts above mentioned are fitted the two slide rings *J J* each having a central opening corresponding in shape to the fluted parts, so as to slide, but not to turn thereon. By this construction it is obvious that by fitting the fluted shaft *G* in line with the fluted ends of the trunnion *D'*, and drive shaft *F*, with the ends abutting, and moving the rings *J* out against the fixed collars *h h*, so as to cover the joints *i i* between the abutting ends, the power of the drive-shaft is transmitted to the trunnion and thence to the annealing pot to turn the latter. After having slipped the holding rings over the abutting ends as aforesaid they may be fastened from slipping back by fitting pieces of wood or other suitable material *j* against the fluted shaft *G* between the rings, and winding a cord or wire *k* around the same to hold them in position.

In Figs. 1' and 6, the removable fluted shaft *G* and its rings are shown fitted in position ready for fastening as aforesaid; while in Figs. 1 and 7 the pieces *J* interposed between the rings are shown fitted and fastened in position.

Any other well-known clutch-device may be used in lieu of that above described, if preferred.

Within the annealing pot *D* are arranged the series of longitudinal metal rods *l* previously referred to which are preferably incased in tubes *m* of fire-clay or similar material to protect the same from the heat required in annealing, and thus prevent their sagging when loaded with the wire rod or wire coils. By thus incasing the rods *l* in fire-clay the metal coils are prevented from coming in contact with the metal of the rods and pot and therefore do not receive or discharge carbon from one to the other, consequently producing a product uniformly annealed and of even texture. Said rods are held at one end in a metal plate *n* held rigid so as to turn with the pot, and at the other ends, in a metal disk *o* which serves as an inner cover for the open end of the pot. In this instance plate *n* is held so as to turn with the pot as aforesaid, by being made polygon in shape and fitting in a similar shaped socket in the closed end of the pot. The rods *l* are passed through openings in the plate and disk with the tubes *m* between said plate and disk, and the parts are detachably fastened by the heads *l'* on one end of the rods and the wedges *l''* passed through suitable openings in their other ends as is shown in Fig. 1 of the drawings.

The open end of the pot may be closed tight

by filling the space between the outer cover *p* and disk *o* with suitable packing material *q*.

In practice the driving power is controlled in any well-known way so as to turn the annealing pot quite slowly during the annealing operation. By thus turning said pot it is obvious that the coils *K* shown in Figs. 4 and 5 are also turned independently on their supporting rods—said coils being made to travel on their supports with a rolling motion as said supports are carried around in a circle by the rotation of the pot. The coils being thus continuously turned, different parts thereof are exposed to the greater heat underneath at each revolution of the pot, and the whole of each coil, as will at once be apparent, is uniformly heated throughout, thereby entirely removing the possibility of "spotting," and resulting in a perfectly annealed product. Not only are the coils uniformly annealed, as aforesaid, but the pots being exposed to the heat evenly at all points, causes them to last much longer, and therefore necessitates their renewal at much longer intervals than by the old way of annealing.

The operation of removing the coils after having been annealed, is as follows: The driving power having been first disconnected from the annealing pot, the cover *A'* is removed from the furnace. Said annealing pot is then taken out and its outer cover and packing removed; after which the skeleton frame, consisting of the rods *l* and their casings, the plate *n* and disk *o* all fastened together, with the coils on the rods, are removed. Then the disk *o* is unfastened and removed from the rods, and finally, said rods and their casings are pulled out endwise from the coils, leaving the latter in a pile where desired, ready for "drawing" or other treatment.

In practice, upon the removal of the annealed coils, as above described, another newly filled pot may at once be placed in the furnace, and the process thus carried on with comparatively little interruption.

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

1. An annealing apparatus composed of the following elements, viz:—the furnace *A* having the removable cover *A'* and otherwise constructed substantially as described, the rotatable annealing pot *D* arranged horizontally in said furnace over the fire-box and having trunnions at each end adapted to turn in suitable bearings *E E* at each side of the furnace, also having within the same a removable skeleton frame provided with a series of longitudinal rods *l* over which the coils may be placed so that an independent rotary motion may be imparted thereto when the pot is turned in the annealing process, also having suitable packing material *q* placed between the head of said skeleton frame and the removable cover of the pot to close the latter tight, said bearings *E E*, and means

whereby the driving power may be connected and disconnected to and from one of the trunnions of said pot, substantially as and for the purpose set forth.

5 2. In an annealing apparatus, the combination of furnace A having the removable cover A', the smoke flue C detachably connected therewith, stationary bearings E E and grates B B; with the removable, rotary annealing pot D arranged horizontally in said furnace above said grates and fitted to turn in said bearings, and the removable skeleton frame for supporting the coils, arranged longitudinally within said annealing pot,—said
10 frame consisting of the series of longitudinal rods *l*, the plate *n* detachably held in the pot at its inner end, the disk *o* coming next to the pot-cover at a short distance therefrom when the frame is fitted in the pot, and means for
15 fastening the various parts of the frame together, substantially as and for the purpose set forth.

3. The furnace A having a removable cover

A' and otherwise made substantially as described, and bearings E E at each side thereof, in combination with the rotatable annealing pot D fitted to turn in said bearings and having a removable cover at one end, a skeleton frame arranged horizontally therein with
25 suitable packing material interposed between the same and the cover of the pot,—said frame consisting of the series of longitudinal rods *l*, the plate *n* adjustably held at the inner end of the pot and provided with openings to receive the rods *l*, the disk *o* coming
30 next to the pot-cover at a short distance therefrom when the frame is fitted therein, also having openings to receive the rods *l*, the fire-proof tubes *m* fitted over the rods between the plate *n* and disk *o* and means for fastening
35 said parts of the frame together, substantially as and for the purpose set forth.

CARL WILHELM BILDT.

Witnesses:

A. A. BARKER,
W. B. NOURSE.