

(No Model.)

S. FOX.

APPARATUS FOR ANNEALING WIRE AND METAL IN OTHER FORMS.

No. 310,402.

Patented Jan. 6, 1885.

Fig. 1.

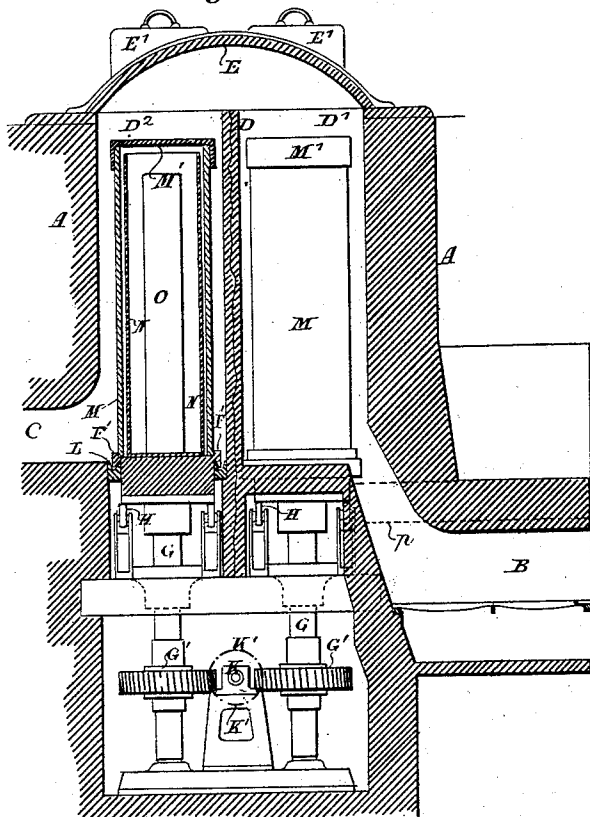


Fig. 4.

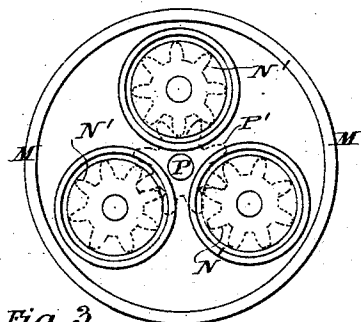


Fig. 3.

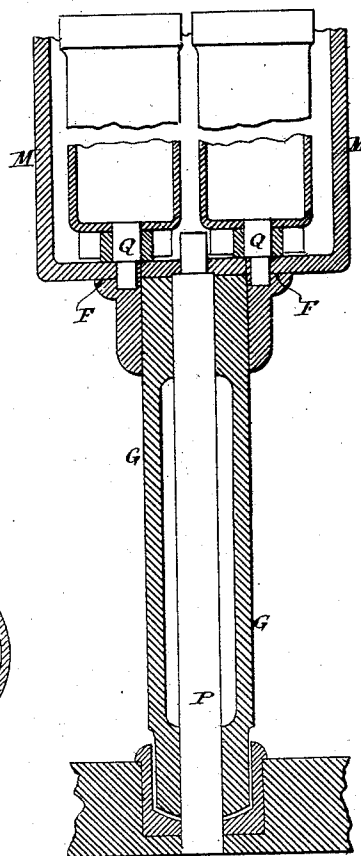


Fig. 2.

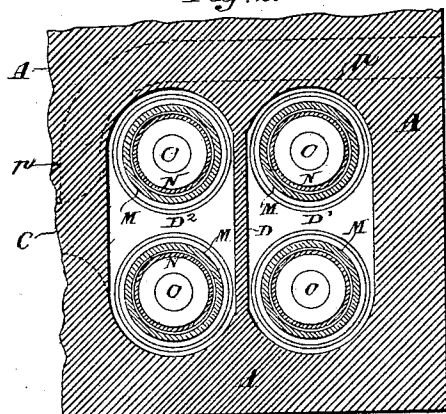
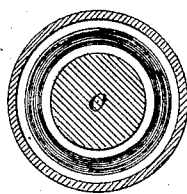


Fig. 5.



Witnesses.
James Young.
Allan McLane Aber.

Inventor.
Samuel Fox
By Atty - Baldwin, Hopkins & Co.

UNITED STATES PATENT OFFICE.

SAMUEL FOX, OF 110 GLOUCESTER PLACE, COUNTY OF MIDDLESEX, ENGLAND.

APPARATUS FOR ANNEALING WIRE AND METAL IN OTHER FORMS.

SPECIFICATION forming part of Letters Patent No. 310,402, dated January 6, 1885.

Application filed May 19, 1884. (No model.) Patented in England November 5, 1883, No. 5,234; in France May 5, 1884, No. 161,901; in Belgium May 7, 1884, No. 65,090; in Germany May 11, 1884, No. 29,779; in Austria-Hungary September 2, 1884, No. 18,025 and No. 39,646.

To all whom it may concern:

Be it known that I, SAMUEL FOX, a subject of the Queen of Great Britain, residing at 110 Gloucester Place, in the county of Middlesex, England, have invented certain new and useful Improvements in Apparatus for Annealing Wire and Metal in other Forms, (for which I have received Letters Patent in Great Britain, No. 5,234, dated November 5, 1883; in France, No. 161,901, dated May 5, 1884; in Belgium, No. 65,090, dated May 7, 1884; in Germany, No. 29,779, dated May 11, 1884; in Austria, No. 18,025, dated September 2, 1884, and in Hungary, No. 39,646, dated September 2, 1884,) of which the following is a specification.

This invention has for its object improvements in apparatus for annealing wire and metal in other forms. For this purpose I employ a furnace having two chambers heated by flame. Flame is caused to ascend in one of the chambers, which I call the "heating-chamber," and in the other chamber, which I call the "cooling-chamber," the cooler but still highly-heated products of combustion descend, and they then pass out into a flue. Each of the furnace-chambers contains two or it may be other number of cylinders set vertically. Every cylinder stands upon a turn-table let into the bottom of the furnace, and kept in rotation by gearing beneath. These cylinders remain permanently in the furnace, and they receive within them other removable cylinders, serving as boxes, and in which the coils of wire or metal to be annealed are packed. In packing the coils I insert also into the cylindrical box a central block or dummy-cylinder, which is of a size to receive the coils around it. The dummy-cylinder serves to displace air from the box, and is otherwise useful. These boxes, when packed and closed, are dropped down into the cylinders contained in the heating-chamber, one box into each cylinder. For this purpose there are movable covers upon the top of the furnace. The boxes remain in the cylinders for some hours until sufficiently hot, and they are then lifted out of the cylinder in the heating-chamber and placed at once in the cylinders in the cooling-chamber. Other boxes packed like the first

are then put into the cylinders of the heating-chamber, and the furnace is closed. When the time comes for removing these boxes in turn, the boxes in the cylinder of the cooling-chamber will be ready to be removed out of the furnace. They may then be at once unpacked. In this way the work goes on continuously, and it is unnecessary to cool the furnace except for repairs.

It is often convenient to replace the dummy-cylinder by an inner cylindrical box containing smaller coils within it, and in the center of these coils a small dummy-cylinder may be placed, if desired.

It is convenient that the draft of the furnace should be upward in the heating-chamber and downward in the cooling-chamber; but this may be varied.

In some cases I make the furnace with three chambers in place of two, and so I can provide for a longer and more complete cooling.

In order that my said invention may be most fully understood and readily carried into effect, I will proceed to describe the drawings hereunto annexed.

Figure 1 is a vertical section, and Fig. 2 is a horizontal section, of an annealing-furnace with apparatus arranged in accordance with my invention. Fig. 3 is a vertical section, and Fig. 4 is a plan, of an annealing-cylinder as arranged to receive several annealing-boxes of small size. Fig. 5 is a section of one of the annealing-boxes.

A A are the walls of the furnace.

B is a fire-chamber where fuel is burned for heating the furnace; or the furnace may be heated by the combustion of gas.

C is the outlet-flue. The body of the furnace is divided into two compartments, D' D², by a central partition, D. The flame and heated products of combustion from the fire ascend on one side of the partition D in the compartment D', and they descend on the other side in the compartment D².

E is a dome which closes in the furnace-chamber at the top. At the bottom of the furnace-chamber four turn-tables, F F, are arranged. They are mounted upon the upper ends of the four vertical axes G G.

H H are rollers which aid in supporting

these turn-tables, so that they may be rotated with facility. The rotary motion is imparted to them by a horizontal axis, K, on which are worms K' K', which gear with worm-wheels

5 G' G', fixed upon the vertical axis G.

L L are sand-troughs let in at the bottom of the furnace-chamber, and lips or inverted flanges F' F' upon the turn-tables F dip into the sand contained in these troughs, and so

10 maintain close joints at the lower part of the furnace-chamber.

MM are the annealing-cylinders, into which are placed the boxes N N, containing the coils of wire or other metal articles to be annealed.

15 M' M' are the covers of the annealing-cylinders, closing them approximately air-tight.

O O are dummy-cylinders inserted in the center of the annealing-boxes with the object of displacing air.

20 The method of working is as already described. The box containing the wire or articles to be annealed is placed first in one or other of the annealing-cylinders in the heating-compartment D' of the furnace-chamber, and when

25 it has remained there a sufficient time to have become thoroughly and equably heated it is removed and placed in one of the cylinders in the other compartment, D², of the furnace-chamber, and here it is allowed to remain while

30 other boxes are heated in the cylinders contained in the compartment D'.
E' E' are the movable covers upon the dome E. They are provided to admit of the introduction of the annealing-boxes and their trans-

35 fer from one cylinder to another, as stated above.
p is a by-flue to divert the draft from the fire while the annealing-chamber is open. A damper is provided in this, and also in the

40 main flue, and when the annealing-chamber is open for recharging the damper in the main flue is closed and that in the by-flue is opened.
Where the coils to be annealed are comparatively small in diameter, I place three

45 separate annealing-boxes in each cylinder in place of one only, and as well as rotating the cylinder itself I cause each of the annealing-boxes within to be rotated also. Fig. 3 is a vertical section showing this arrangement,

50 and Fig. 4 is a horizontal section.
M is the annealing-cylinder, standing on a turn-table, F, and G is the axis upon which these parts are mounted. The axis G is rotated by means of a worm and a worm-wheel

55 upon it, as already described. The axis, how-

ever, in this case is hollow, and a stationary stem, P, passes up through it and into the annealing-cylinder. The stem P has a pinion, P', fixed upon it at its upper end within the annealing-cylinder, and each annealing-box 60 N has a corresponding pinion, N', fixed upon it at its lower end and gearing with the central pinion.

Q Q are studs in the turn-table F, upon which the pinions N' N' and the annealing-boxes N, to which they are attached, revolve, rotary motion being imparted to them about the studs by the stationary central pinion, P', about which they are carried by the rotation of the annealing-cylinder. 70

Fig. 5 is a horizontal section through one of the annealing-boxes. It shows coils of wire therein, and a dummy-cylinder, O, in the center. By the use of the dummy-cylinders air is to a certain extent displaced from the interior of the annealing-boxes. 75

As already stated, the dummy-cylinder may in some cases be itself an annealing-box containing coils of wire of small diameter.

Having thus described the nature of my 80 said invention and the manner of performing the same, I would have it understood that I claim—

1. The arrangement of annealing furnaces and apparatus, as herein described, the body 85 of the furnace being divided into two compartments, serving the one as a heating and the other as a cooling chamber, and containing annealing-cylinders to which a rotary motion is imparted, substantially as herein de- 90 scribed.

2. The arrangement of annealing furnaces and apparatus consisting of an annealing-chamber containing rotating annealing-cylinders, each receiving within it an annealing-box 95 which approximately fits it, and which contains coils of wire to be annealed, substantially as described.

3. The combination, in annealing apparatus essentially such as described, of rotating an- 100 nealing-cylinders, annealing-boxes within said cylinders, and dummy-cylinders within the annealing-boxes, substantially as and for the purpose set forth.

SAMUEL FOX.

Witnesses:

JAMES WILLIS,
Rosendale, Bournemouth, Hants.
JOHN DEAN,
17 Gracechurch Street, London.