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C. KUGEL.

FURNACE FOR THE CONTINUOUS HEATING OF METAL OBJECTS WITHOUT OXIDATION.

APPLICATION FILED APR. 30, 1904.

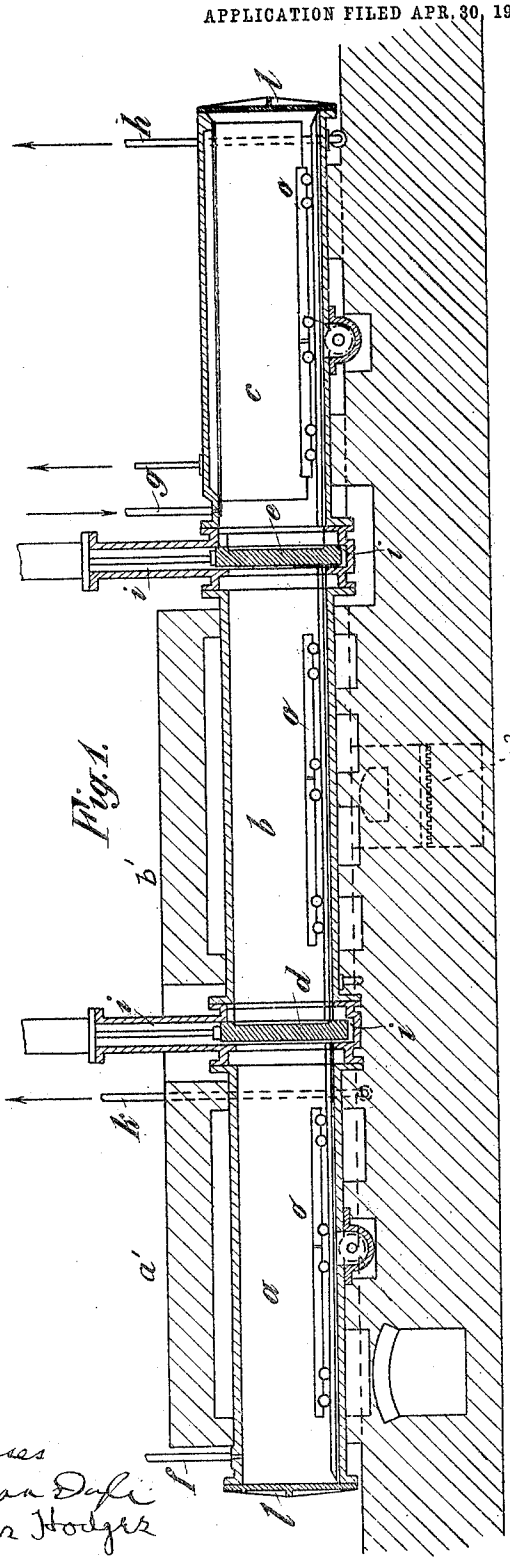


Fig. 1.

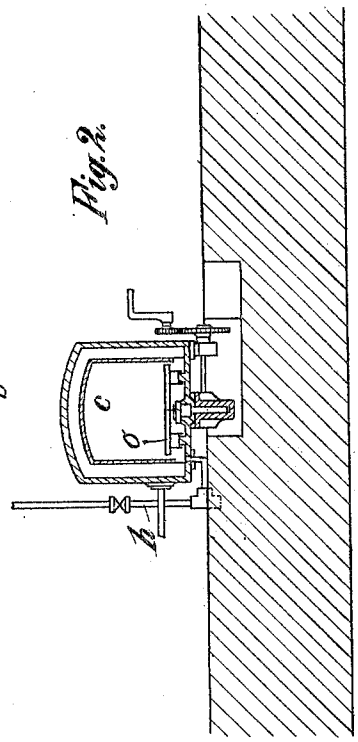


Fig. 2.

Witnesses
H. Jussen Duffi
Lewis Hodges

Inventor
Karl Kugel
by Wright, Brown & Quinby
Attorneys

ANDREW. B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CARL KUGEL, OF WERDOHL, GERMANY.

FURNACE FOR THE CONTINUOUS HEATING OF METAL OBJECTS WITHOUT OXIDATION.

No. 802,517. Specification of Letters Patent. Patented Oct. 24, 1905.

Application filed April 30, 1904. Serial No. 205,824.

To all whom it may concern:

Be it known that I, CARL KUGEL, factory manager, a subject of the King of Prussia, German Emperor, residing at Werdohl, Province of Westphalia, Kingdom of Prussia, German Empire, have invented a new and useful Heating-Furnace for Continuous Heating of Metal Objects Without Oxidation, of which the following is a specification.

This invention refers to an annealing-furnace for the heating of metals which allows of being worked continuously and by means of which the oxidizing of the surface of the metals which are to be heated is prevented by effecting the heating out of contact with the flame in an atmosphere which will not act by oxidation or in any other manner upon the heated metals.

In the treatment of iron, brass, copper, and the like it is well known that the metal in consequence of the drawing process acquires a degree of hardness which can only be removed by annealing or heating the metals and then allowing them to cool again slowly. The annealing has heretofore been effected in such a manner that the metals and metal articles to be heated were incased in iron vessels which were closed by a cover and by filling the joints with loam and the like, so that the heating-flame is prevented from coming directly in contact with the articles to be annealed. The vessels after having been closed in this manner were placed in the annealing-furnace, where they are surrounded by the flames, and, with their contents, they are then brought up to the desired heat. After reasonable time the ovens were opened and the heating vessels taken out for the purpose of allowing them to cool off slowly. This process, in view of its being necessary to heat the heating vessels up to the annealing temperature for each run, consumes a very great amount of burning material, and it was also very time-wasting and did not yield perfectly satisfactory results. In my invention these objections are avoided, since the annealing operation may be kept up continuously, there being no necessity for cooling the heating-retorts after each annealing operation.

My invention consists in the construction and combination of parts, substantially as hereinafter described and claimed.

In the accompanying drawings, Figure 1 represents a longitudinal section of an apparatus embodying my invention. Fig. 2 represents a vertical section through substantially the center of the cooling oven or retort.

Three retorts or chambers *a*, *b*, and *c* are arranged in alinement with each other, the retorts *a* and *b* being inclosed within suitable furnace-casings *a'* and *b'*, respectively. The retort *c* is surrounded by a suitable casing, and the space between the retort and casing may be supplied with a suitable cooling agent. To replace the air in the preliminary-heating retort *a* and in the cooling-chamber *c* by a neutral gas—for instance, steam—pipes *f* and *g* are arranged, respectively, to introduce the gas, escape-pipes *k h*, respectively, being connected with said retort *a* and chamber *c*. The pipe *k* is connected to the retort *a* substantially in the same manner as the connection of pipe *h* with chamber *c*, as shown in Fig. 2. Above the meeting ends of the three retorts or chambers are casings *i*, into which the slides or doors *d* and *e* may be withdrawn by suitable means. The outer ends of the retorts *a* and *c* are provided with suitable doors *l*.

For carrying the metal objects to be annealed suitable wheeled trucks *o* are employed, said trucks being adapted to be moved from one retort to another by any suitable means.

In order to operate the furnace, the cooling and preliminary-heating retorts *a* and *c* are closed by the covers *l l* at their outer ends. The slides *d* and *e*, however, are opened. Thereupon neutral gases are introduced by the pipe *f*, the gases being allowed to escape only by way of the pipes *k* and *h* or pipe *h* until the retorts have all been filled sufficiently with neutral gas. The slides *d* and *e* are then closed, and the continuous operation may commence. First, a truck *o* or a pair of trucks carrying the objects to be annealed are pushed into the retort *a*, which is subjected to a preliminary heating and which may be heated by the waste gases from the furnace b^2 by means of any suitable passage-ways for such gases. The front door *l* and the slide-door *d* are then closed. Then the air contained in the retort *a* is replaced by steam or by some other neutral gas. After the preliminary heating has been finished the slide-door *d* is raised into the casing *i* and the truck or trucks pushed into the annealing-retort *b*, which is subjected to a much higher temperature than retort *a*. Then the door *d* is closed. After the metallic objects have remained a sufficient time in the annealing-retort *b* the slide-door *e* is raised and the truck or trucks pushed into chamber *c*, and then the door *e* is closed, after

which the truck or trucks may remain in the cooling-chamber *c* during the annealing of another supply of metallic goods in retort *b*.

It will be obvious that any suitable means for pushing the trucks through the series of retorts may be employed, or the trucks in the retort *a* may be employed to push all of the trucks in the chambers *b* and *c* forward when the doors are all open. With the continuous series of trucks being pushed intermittently forward, the doors being closed for a time, the operations of preliminary heating, annealing, and cooling will be continuous.

What I claim is—

1. A heating-furnace for continuous heating of metal without oxidation comprising three chambers arranged to communicate with each other, means for shutting off communication between the chambers, means for closing the front end of the first chamber and the rear end of the last chamber, means for heating the first chamber and the intermediate chamber, and means for introducing neutral gases into the chambers.

2. A heating-furnace for continuous heating of metals without oxidation comprising a preliminary-heating chamber, a heating-chamber proper and a cooling-chamber in alinement with each other, means for closing communication between the chambers and for closing gas-tight the outer ends of the first and last chambers, means for heating the preliminary chamber and the heating-chamber proper, and means for introducing neutral gases into the chambers to drive out oxidizing-gases.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

CARL KUGEL.

Witnesses:
PETER LIEBER,
WILLIAM ESSENWEIN.