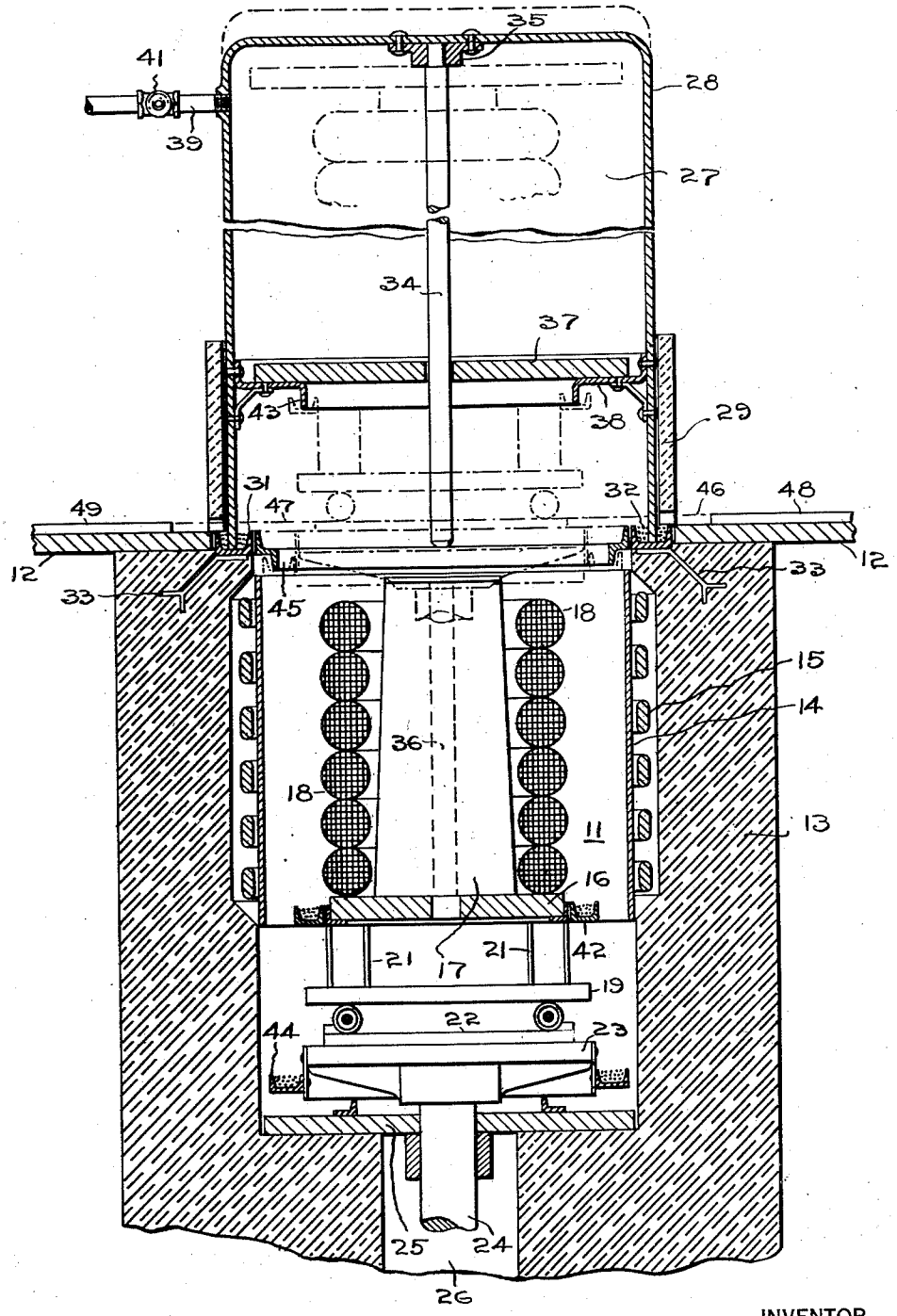
Jan. 22, 1929. 1,699,784

A. FUCHS

ANNEALING FURNACE

Filed May 15, 1926



WITNESSES:

R. S. Harrison

W M Bielel

INVENTOR

August Fuchs

BY

Wesley G. Carr

ATTORNEY

Patented Jan. 22, 1929. 1,699,784

UNITED STATES PATENT OFFICE.

AUGUST FUCHS, OF BERLIN-SIEMENSSTADT, GERMANY, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

ANNEALING FURNACE.

Application filed May 15, 1926, Serial No. 109,414, and in Germany June 26, 1925.

My invention relates to furnaces, and particularly to anea_ -g furnaces.

An object of my invention is to provide a relatively simple construction for an annealing furnace that shall permit of substantially continuous operation thereof.

Another object of my invention is to provide an annealing furnace embodying a single annealing chamber and a plurality of removable hoods constituting cooling chambers to be successively operatively associated therewith.

Another object of my invention is to provide means for moving the material from the annealing chamber into the cooling chamber and for effecting closure of the two chambers relatively to each other.

In practicing my invention, I provide a heat-insulating annealing chamber and a superposed cooling chamber that is removable therefrom. A material-supporting means is provided that is effective to move the annealed material from the annealing chamber into the cooling chamber. Sealing means are provided to effect sealing of the two chambers relatively to each other and to the outer air. The closed cooling chamber and the annealed material located therein may be moved away from the annealing chamber structure to permit of the material being cooled, while a new charge is placed in the annealing chamber to be heat treated.

The single figure of the drawing illustrates a device embodying my invention, shown in vertical section.

An annealing chamber 11 may be located below the level of a floor, indicated by floor plates 12, and is surrounded by suitable heat-insulating refractory material, indicated generally by the numeral 13. The dimensions and contour of the annealing chamber 11 may be of any suitable or desired kind and will more particularly be in accordance with the shape and the amount of the material to be annealed or otherwise heat treated at any one time.

The upper portion of the annealing chamber 11 may have located therein a casing or container 14 which may be considered to constitute a muffle plate, electric heating means 15 being located between the casing 14 and the wall 13, suitable connections (not shown) being provided to permit of energizing the heating means.

A material-supporting means located within the annealing chamber 11 comprises a platform 16 which may be of any type usually employed in the art, upon which there is located a central member 17 of conical shape, which may be either of a highly refractory metal or of ceramic material, around which bundles of wire 18 which are to be annealed in the particular furnace illustrated and described, may be located.

The member 16 is supported on a car structure 19 comprising a suitable platform and wheels, spacing blocks 21 being provided between the platform of the truck 19 and the supporting member 16 to prevent the transmission of excessive heat from the upper portion of the annealing chamber 11 to the material supporting and moving means normally located in the lower part of the chamber, which, as shown in the drawing, is not provided with heating elements.

The truck 19 is located on rails 22 that are mounted on a head 23 that is mounted on a piston 24, which is movable vertically upwardly and downwardly by means not shown but well understood in the art. A closure plate 25 is provided at the bottom of the lower portion of the annealing chamber 11 to separate the annealing chamber 11 from the head-operating chamber 26.

A cooling chamber 27 is located immediately above the annealing chamber 11 during the annealing operation of the furnace and is constituted by a casing or hood 28, the upper portion of which may be of relatively thin material only, while the lower annular or peripheral portion thereof is surrounded by a heat-insulating layer 29 of material suitably secured thereto and movable therewith. The lower edge or rim of the hood member 28 fits into a member 31, of channel form in lateral section, which is filled with sand 32 or some other means co-operating with the lower rim of the hood member 28 to constitute a sand seal or, in general, a means for sealing the hood against the entrance of air into the chambers 11 and 27. The member 31 may be supported by metal inserts 33 of any desired shape embedded in the refractory material 13.

A guide member 34 in the shape of a depending rod has its upper end secured to a holding member 35 which is riveted or bolted to the top portion of the hood 28. A corresponding opening 36 extends centrally and longitudinally through the member 17, so that when the material-supporting means, and the

material located thereon are moved upwardly, the member 34 will enter the opening 36 and guide the members.

During the annealing operation, the material is located in substantially the position shown in the drawing within the annealing chamber 11 and therefore the lower portion of the cooling chamber under the hood 28 is in communication with the annealing chamber 11. A refractory plate 37, that is located within the hood 28, is normally supported by an annular member 38 which is suitably secured to the metallic hood 28. The member 37 may be, and preferably is, of refractory heat-insulating material and, when located in the position shown in the drawing, it separates the annealing chamber from the cooling chamber 27 within the hood member 28.

As it may be desirable to effect annealing and cooling in either an atmosphere of inert gas or of a reducing gas, a conduit 39 is secured to the hood member 28 at the upper portion thereof and is connected by a flexible conduit (not shown) to a source of supply of such gas, a valve member 41 being provided to regulate the admission of the gas.

If it be assumed that the material has been properly annealed and that it is desired to remove the same from the annealing chamber 11 and to permit of its cooling slowly within or under the hood 28, the material-supporting means is caused to move upwardly until the parts occupy the positions indicated by the broken lines, the material 18 being located within the upper portion of the cooling chamber 27. In this position an annular member 42 of channel-shape in lateral section, mounted on the support 16, engages a depending flange portion 43 integral with the annular member 38, heretofore described, thereby effecting a closure of the cooling chamber 27.

An annular member 44, of channel section, is operatively associated with the head 22 and engages the depending flange portion of an annular member 45 located within the member 31. The members 42 and 44 are filled with a suitable sealing material, such as sand, to effect an air-tight joint. When the member 45 engages or fits into the member 44, the annealing chamber will also be sealed air-tight relatively to the cooling chamber 27.

Short rail sections 46 and 47 are then placed in proper operative position between fixed rails 48 and 49 located on the floor members 12, so that it is possible to move the hood 28, the truck 19 and the material located thereon which has just been annealed, away from the position indicated in the drawing. To permit this movement, the relative dimensions and locations of the parts hereinbefore described are such that the hood member is raised vertically upwardly to such extent that the lower rim portion of the hood 28 is disengaged from the sand 32 in the member 31, whereby it is possible to move the hood 28, the truck 19, the material-supporting members located thereon, and any material supported thereby, away from the furnace structure in either direction on the rails 48 or 49.

It may be noted that when the hood 28 and any material and the truck located therein is moved away from the rest of the furnace structure, both the annealing chamber and the cooling chamber are sealed against the admission of air from the outside.

A plurality of trucks 19 and material-supporting means located thereon is provided and as soon as one hood and a truck located thereunder has been removed, another hood and truck located thereunder and piled with material to be heat-treated may be moved in proper operative position substantially as shown in the drawing, the material-raising means may be permitted to lower the material and truck into the position shown by the full lines in the drawing, after which another annealing operation may be immediately effected. These exchanges of trucks may be made quickly so that but little heat will be lost from the heated structure surrounding the annealing chamber, thereby effecting the annealing operation at a relatively high thermal efficiency. The heat insulating means 29 prevents loss of heat from the upper part of the material 18 and from the annealing chamber during the annealing or heat treating operation.

The number of hoods 28 and trucks that must be provided will be in proportion to the length of time of annealing in comparison to the length of time of cooling. It is obvious that a relatively short time of annealing and a relatively long time of cooling will require a much larger number of hoods and trucks than would be the case if the time of cooling were relatively short.

The device and method embodying my invention thus provide a relatively simple method of, and means for, effecting intermittent annealing operations in a substantially fixed furnace structure in an inert or in a reducing atmosphere, removing the heat-treated material from the annealing chamber immediately upon completion of the heat-treating cycle and maintaining it in a substantially closed chamber during a cooling cycle of any desired kind.

Various modifications may be made in the device and method embodying my invention without departing from the spirit and scope thereof, and I desire that only such limitations shall be placed thereon as are imposed by the prior art.

I claim as my invention:

1. An annealing furnace assembly comprising a substantially fixed annealing chamber, a laterally removable cooling hood located above the annealing chamber, means in the annealing chamber for supporting material therein and for moving it into said

hood, and means associated with the supporting means for effecting closure of the two chambers relatively to each other and to raise said cooling hood out of cooperation with said chamber, when the supporting means has been moved into its raised position.

2. An annealing furnace comprising a plurality of walls defining an annealing chamber, a superposed cooling hood closing said chamber, material supporting means in the annealing chamber, and means projecting through the bottom of said chamber for raising said supporting means into the cooling hood for effecting closure of the said two chambers when in the upper limiting position, and for raising the hood of the cooling chamber from its normal operative engagement with the walls of the annealing chamber.

3. In an annealing furnace the combination with an annealing chamber and a removable hood supported above said chamber and normally effecting the closure thereof, of means within the chamber for carrying material to be annealed, and means also within said chamber for raising said hood out of cooperation with said chamber, thereby permitting the lateral removal of said hood and material carrying means.

4. In an annealing furnace, the combination with an open-top annealing chamber and a cooling hood operatively closing the open top thereof, of a movable material supporting means adapted to be supported within said chamber during the annealing operation, and means within said chamber operative to move said material support into said hood, to disengage said hood from said chamber and to close the top of said chamber, thereby permitting the lateral removal of said hood and material supporting means.

In testimony whereof, I have hereunto subscribed my name this 21st day of April, 1921.

AUGUST FUCHS.