May 21, 1929. W. A. TIMM 1,713,790

APPARATUS FOR HEAT TREATING METALS

Filed Nov. 15, 1926

Fig. 2.

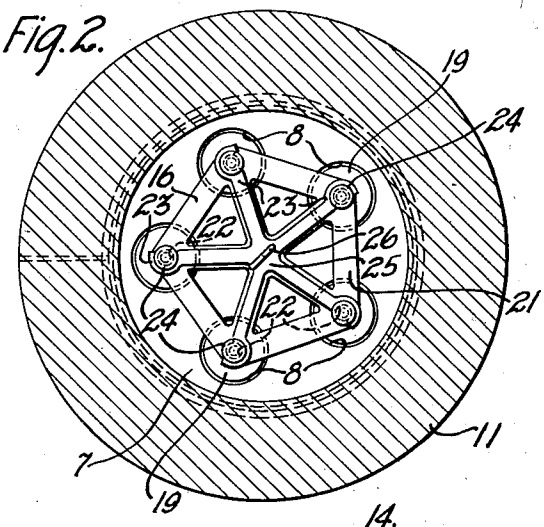


Fig. 3.

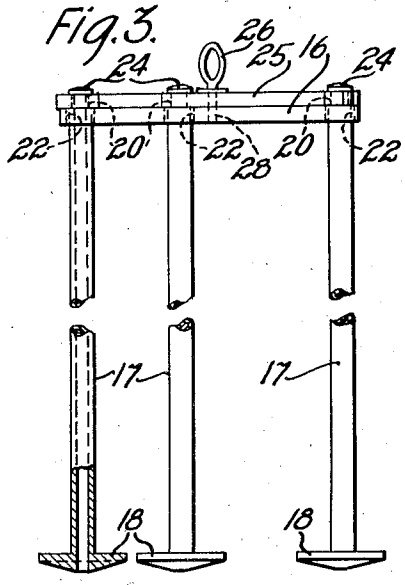


Fig. 1.

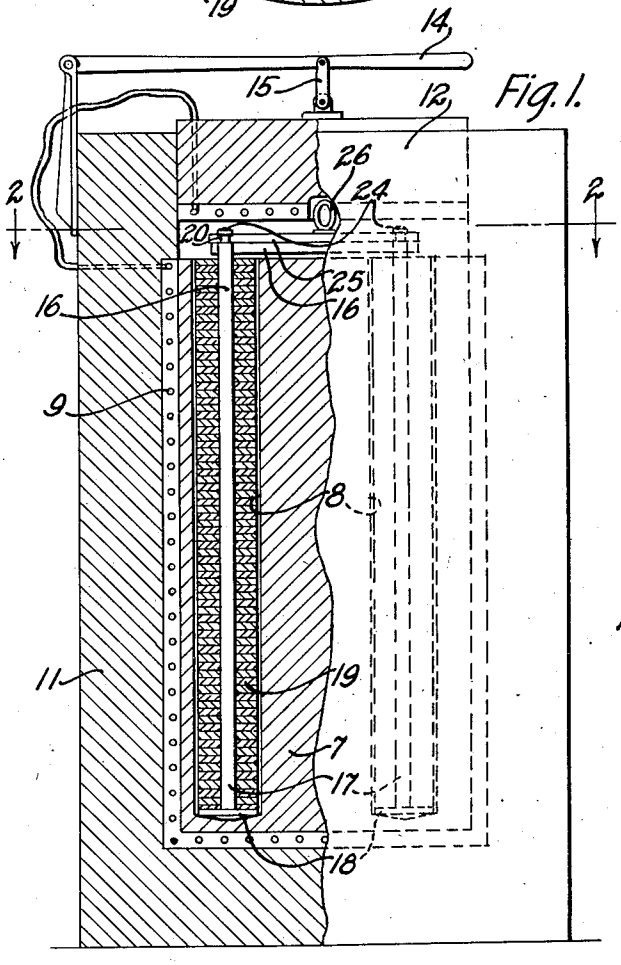


Fig. 5.

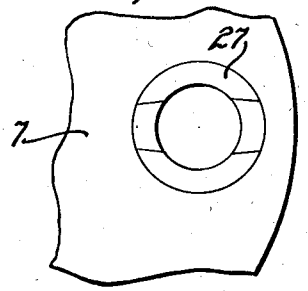
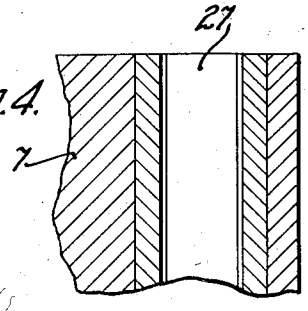


Fig. 4.



Inventor
William A. Timm
by Atty.

Patented May 21, 1929. 1,713,790

UNITED STATES PATENT OFFICE.

WILLIAM AUGUST TIMM, OF BERWYN, ILLINOIS, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

APPARATUS FOR HEAT TREATING METALS.

Application filed November 15, 1926. Serial No. 148,424.

This invention relates to apparatus for heat treating metals, and more particularly to apparatus for annealing magnetic cores for loading coils principally used in telephone transmission lines.

In the manufacture of magnetic cores consisting of nickel and iron and referred to hereinafter as "permalloy", the magnetic alloy is ground to a finely divided form and then mixed with an insulating material. This mixture is placed in a mold and subjected to a pressure of such magnitude as to cause it to assume the form of an integral solid of a desired shape. In order to produce desirable magnetic properties it is necessary to anneal the molded structures, which presents special problems and requirements which may be disregarded without serious consequences in annealing many of the ordinary metals.

Objects of the present invention are the provision of apparatus for heat treating articles which will produce a better and more uniform product.

The invention contemplates an accurate control of the annealing temperature and a uniform distribution of heat to all of the parts to be annealed. In accordance with one embodiment of the invention, the temperature is controlled by storing a quantity of heat in a surrounding medium and conductively heating therefrom the material to be annealed.

It is believed that a complete understanding of the invention may be had by reference to the following description taken in conjunction with the accompanying drawing, illustrating an apparatus embodying the invention, and in which

Fig. 1 represents a side view partially in section of an annealing furnace;

Fig. 2 represents a sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 represents a rack for holding a quantity of permalloy cores;

Fig. 4 shows a sleeve for changing the size of the openings in the furnace block, and

Fig. 5 is a plan view of Fig. 4.

Referring to the drawing in which similar reference characters represent the same parts in the several views, the interior of the furnace consists of a block 7 of material having a high heat conductivity such as cast iron or copper. The block is provided with a number of cylindrical bores 8 in which the material to be annealed is placed, and surrounding the block on all sides is a resistance element 9 of any suitable type for electrically heating the block. The dissipation of heat from the block is reduced by surrounding the block and the resistance element with a thick layer of thermal non-conducting material 11.

The furnace is provided with a cover 12 having the same construction as the walls of the furnace and provided with a hinged handle 14 which is connected to the cover by a link connection 15 to facilitate the removing and replacing of the cover.

A rack 16 is provided for the convenient handling of the permalloy cores which are in the form of rings when used for loading coils on telephone transmission lines. The rack comprises a number of tubular rods 17 having heads 18 upon which the permalloy rings 19 may be stacked. The rods are detachably secured to a frame 21 which is provided with holes 22 through which the rods may be inserted in the frame where they are retained by hooks 23 which engage the rods at a reduced portion 20 at the base of heads 24 and prevent the withdrawal of the rods. All of the hooks 23 are attached to a common spider 25 which is rotatably mounted on the frame by a pin 28 of a hoisting ring 26.

In order to accommodate the furnace for annealing various sizes of rings, a split sleeve 27 having four sections of the same material as the block 7 is provided which fits snugly in the cylindrical bore and in effect reduces its size.

In utilizing the apparatus embodying this invention, the permalloy rings which are to be annealed are stacked upon the tubular rods of the rack which are then inserted in the frame of the rack and the spider is rotated until the hooks carried thereby are in engagement with the rods preventing their separation from the frame. The rack is then placed in the furnace, each of the stacks occupying one of the cylindrical bores of the furnace block and each of the permalloy rings being therefore in heat conducting relation with the furnace block, or with one of the split rings, if the size of the permalloy rings is such as to necessitate the use of the split rings.

Before the charge is placed in the furnace the temperature of the furnace is brought to

a value of about 1075° F. This value is made slightly higher than the annealing temperature on account of the fact that when the charge, which is at room temperature, is placed in the furnace it will absorb a considerable amount of heat stored in the furnace block and bring its temperature down to the desired value. It has been found that the best annealing results are obtained when the rings are heated to a temperature of 930° F. in less than thirty minutes and retained at that temperature for about twenty minutes. The temperature of the charge should not vary over ten degrees from the given value during the twenty minutes. It will be seen that on account of the large amount of heat stored in the block of the furnace and the conductive relation between the entire charge and the block, the temperature of the rings will be quickly and uniformly brought to the proper value. The large mass of the furnace block will tend to keep the variation of temperature within the prescribed limits.

After the charge has been held at the proper temperature for the required time it is removed and the furnace is ready for a repetition of the process.

It will be understood that the embodiment of the invention herein described and illustrated is merely a convenient and useful form of the invention, which is capable of many other modifications without departing from the spirit and scope of the invention.

What is claimed is:

1. A furnace for annealing ring-shaped articles, comprising a metallic block provided with a plurality of cylindrical cavities adapted to receive the articles, a rack having a plurality of depending hollow rods for supporting stacks of articles, a spider adapted to detachably and simultaneously engage the rods whereby the rack and stacks may be lowered into and raised out of the block, and means for heating said block comprising a receptacle and a cover therefor, said receptacle and said cover being provided with heating elements.

2. A furnace for annealing ring-shaped articles, comprising a metallic block having formed therein a plurality of cylindrical cavities of a diameter slightly greater than that of the articles, means for heating the block, a rack provided with a plurality of depending rods for supporting stacks of articles, and a spider provided with hooks adapted to detachably and simultaneously engage the rods whereby the rack and stacks may be lowered into the block to effect a heat conducting relation between the articles and the block.

In witness whereof, I hereunto subscribe my name this 4th day of November A. D., 1926.

WILLIAM AUGUST TIMM.