Aug. 25, 1931. A. G. LOBLEY 1,820,668

ELECTRIC FURNACE

Filed Aug. 7, 1929 3 Sheets-Sheet 1

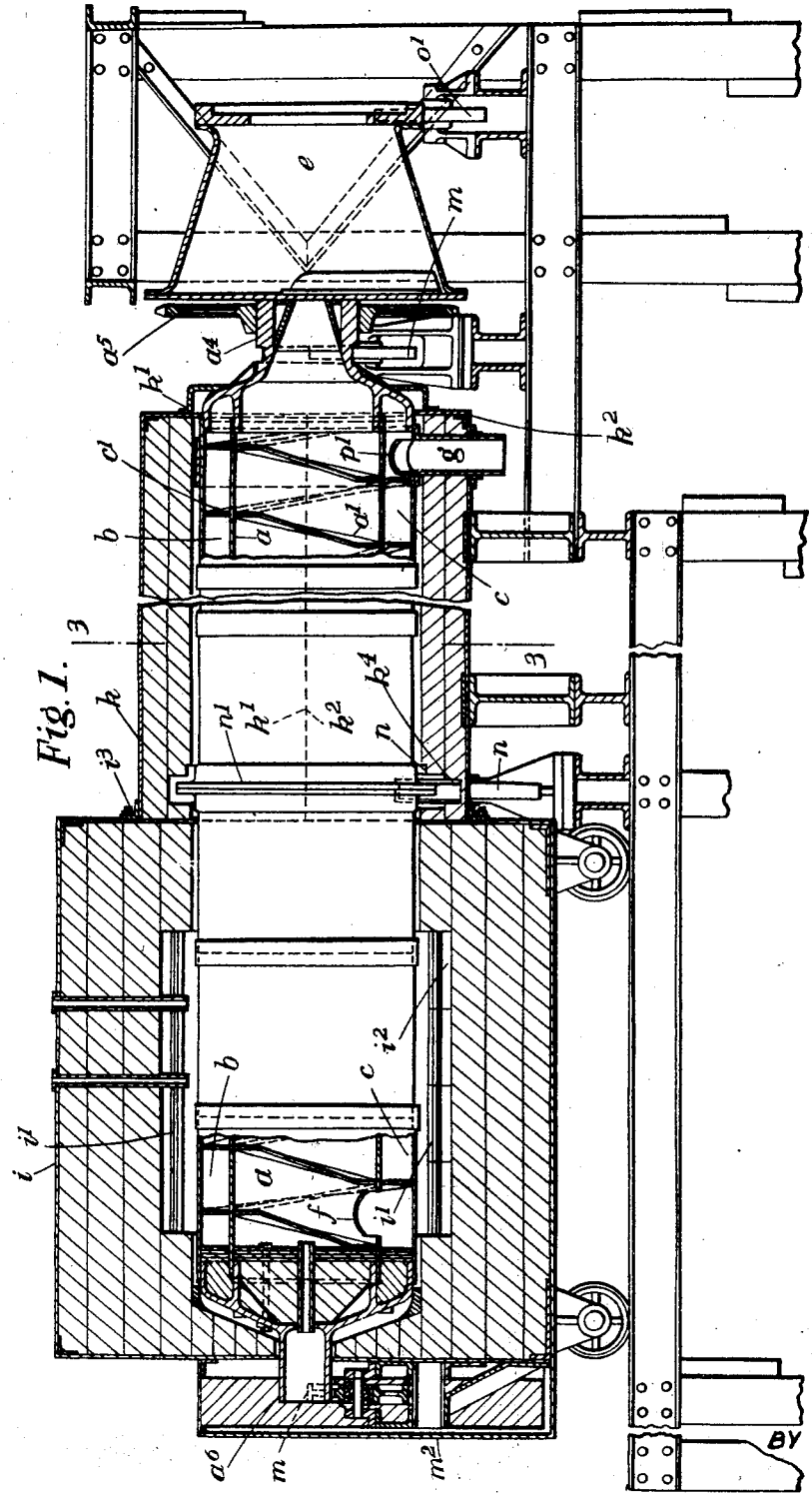


Fig. 1.

INVENTOR
A. G. Lobley

BY
Marshall

ATTORNEY

Aug. 25, 1931. A. G. LOBLEY 1,820,668

ELECTRIC FURNACE

Filed Aug. 7, 1929 3 Sheets-Sheet 2

Fig. 3.

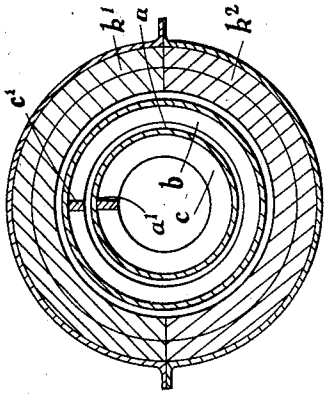
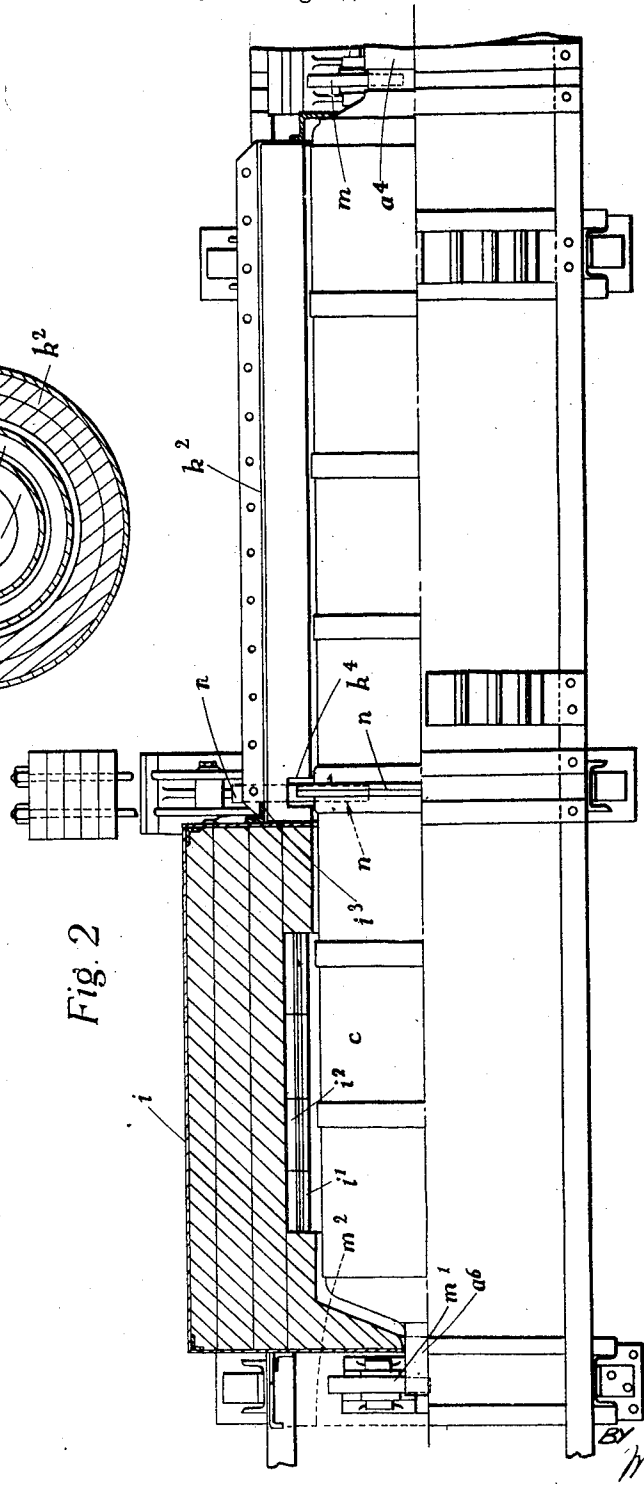


Fig. 2



INVENTOR
A. G. Lobley
BY
Mark Allen
ATTORNEY

Aug. 25, 1931. A. G. LOBLEY 1,820,668

ELECTRIC FURNACE

Filed Aug. 7, 1929 3 Sheets-Sheet 3

Fig. 4.

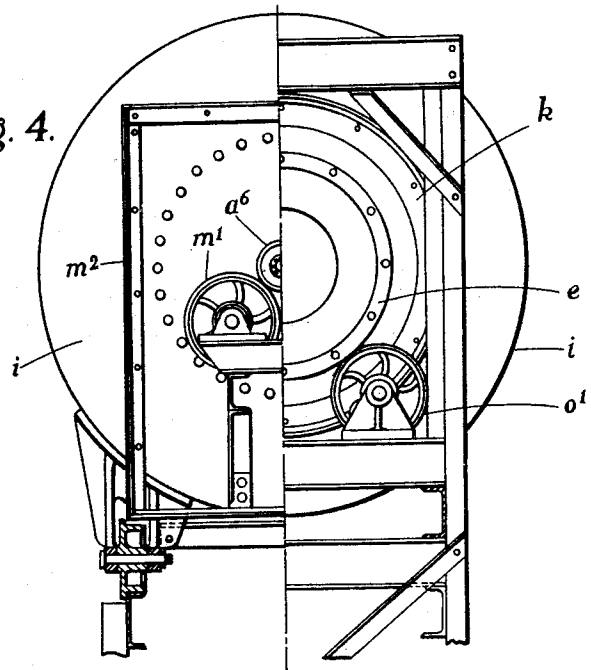
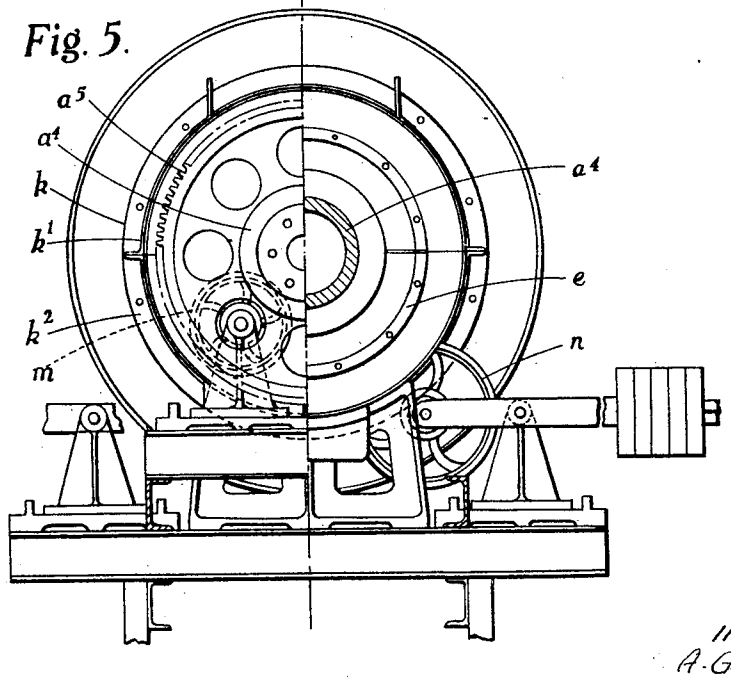


Fig. 5.



INVENTOR:
A. G. Lobley

BY
Marks & Allen

ATTORNEY

Patented Aug. 25, 1931

1,820,668

UNITED STATES PATENT OFFICE

ALFRED GLYNNE LOBLEY, OF BIRMINGHAM, ENGLAND, ASSIGNOR OF ONE-HALF TO BIRMINGHAM ELECTRIC FURNACES LIMITED, OF BIRMINGHAM, ENGLAND, A COMPANY OF GREAT BRITAIN

ELECTRIC FURNACE

Application filed August 7, 1929, Serial No. 384,065, and in Great Britain December 28, 1928.

This invention has reference to furnaces of the rotary or rotating-drum type as used for the annealing or other heat-treatment of small metal products, such as cartridge cases, and proposes to provide an improved construction of electric furnace which is adapted to operate on continuous recuperative principles by enabling an exchange of heat between hot work which is being conveyed from the treatment region and the work which is being carried to the said region.

According to the said invention, the work-conveyor is adapted to be rotated within a stationary casing and relatively to a stationary heater structure whose casing is normally connected to, or forms a continuation of, the conveyor casing but is separable or removable from the latter to enable access to be obtained to the interior of the furnace-chamber wherein the resistance elements are mounted.

The conveyor is so constructed internally that when the same is rotated relatively to the stationary heater, the work charged thereinto will be conveyed through one compartment to the heated or treatment end and there be transferred to another compartment wherethrough the heat-treated work is returned or conveyed, in the reverse direction, to the delivery or discharge aperture. During this return travel through the rotating structure, the outgoing hot work in the one compartment is constrained to contact with the walls (which are made of heat-conducting metal) of the chamber containing the ingoing work, and as the arrangement of the conveyor in relation to the heater provides for a substantial travel of the incoming and outgoing work within the part of the conveyor that is external to the heating chamber, it follows that effective heat-exchange is provided for and that the ingoing work is materially pre-heated before arriving at the part of the conveyor where the work comes under the heater treatment and is transferred from the one compartment to the other.

A furnace or heat-treatment installation constructed in accordance with an embodiment of the present invention is shown in the accompanying drawings in which

Figure 1 is a longitudinal section showing the general arrangement.

Figure 2 is a view showing a half longitudinal section of the furnace and of the stationary conveyor-casing and a half plan of the conveyor-drum.

Figure 3 is a section of Figure 2 on the dotted line 3—3.

Figure 4 is a view showing, on the right hand side, a half elevation of the bearing system provided for supporting the charging-hopper end of the conveyor, and, on the left hand side, a half elevation of the bearings supporting the furnace end of the said conveyor.

Figure 5 shows, on the right hand side, the arrangement of the bearings that extend into the casing to support the conveyor intermediate the charger and furnace ends, whilst the left hand end of the view shows a half elevation of the arrangements for supporting and driving the rotary conveyor at its hopper end.

In the structure illustrated, the inner work-conveyor cylinder a and the annular space b between the inner and outer cylinders a c, are respectively furnished with systems of spiral conveyor blades a^1 c^1 of opposite pitch so arranged that, during rotation of the said conveyor relatively to the furnace part i of the installation, work in the one chamber or cylinder will be conveyed or carried along in the opposite direction to the work in the other chamber, or be made to traverse, counter-flow fashion, from the feed hopper e along the one chamber a to the transfer aperture f and thence in the reverse direction along the other chamber b to the delivery or discharge chute g.

Where the conveyor is driven counter-clockwise and the inner cylinder receives the work from the feed hopper, the conveyor in the said inner cylinder is fitted with right-hand spiral blades and carries the work forward or inwardly towards and through the resistance-heated region h to the transfer chamber, where the heated work falls by gravity into the left-hand conveyor-spiral of the outer chamber and is returned along the latter to the feed end whence it is finally

discharged or allowed to gravitate into a delivery chute. During this return flow, the heated work traversing the chamber b is constrained to move in contact with the walls of the inner cylinder containing cold or relatively cold work, and as the said inner cylinder is made of heat-conducting metal, an effective heat-exchange takes place between the incoming and outgoing work, enabling the latter recuperatively to heat the ingoing work during its travel towards the resistance-heated region.

The resistance-heater elements or units i^1 of the heater or actual furnace part i of the stationary structure are preferably arranged in a heating chamber i^2 that surrounds the transfer end of the conveyor, which latter is substantially longer than the said heating chamber to ensure the incoming and outgoing work having to traverse substantial distances through regions of the conveyor external to the actual furnace, in order to enable useful pre-heating of the incoming work.

That part of the conveyor which is external to the heater is enclosed within a suitably-lagged and stationary insulating casing k which is suitably carried on the frame of the installation and is built up of longitudinally-divided sections or halves k^1 k^2 to enable the assembly of the said casing around the conveyor. The inner end of this casing is bolted or otherwise detachably secured to the corresponding end of the heater-casing at i^3, and the bearings that support the heater end of the said conveyor are so constructed and arranged (such as hereinafter described) that, when it is desired to obtain access to the interior of the heating-chamber, as for inspecting or replacing resistances, the heater structure, which may be supported on a wheeled truck or trolley running on rails embodied in the under-frame of the installation, may be disconnected from the stationary casing k of the conveyor and run back clear of the said conveyor which remains supported by the bearings provided for carrying the same at the hopper or charging end and intermediate the hopper and the heater or transfer end.

To enable this, and also to provide for the adequate support of the rotating conveyor and its load during normal working, the charging or hopper end a^4 of the conveyor is supported, adjacent to the chain wheel a^5 that drives the rotary parts, by a system of bearings m whose brackets are carried by the under-frame of the structure, whilst the other or heater end of the conveyor has a trunnion a^6 that normally extends through an aperture in the end-wall of the heater-casing and is supported by bearings m^1 whose brackets are fixed to the said casing which are housed in a heat-insulated chamber m^2 attached to the outside of the structure, so that when the heater part is disconnected and run away from the casing k, it carries the conveyor-bearings m^1 with it.

Further intermediate bearings for the conveyor are provided by a system of rollers n which are bracketed, externally to the casing k, on the under-frame, but parts of which extend through apertures k^4 in the said casing and are engaged by a flange n^1 that surrounds the middle portion of the conveyor. These intermediate bearings n and the hopper-end bearings m serve to support the conveyor when the heater-end trunnion a^6 is left unsupported by the running back of the furnace on its trolley.

The feed or charging hopper e of the conveyor is a part of the rotating unit and is supported by bearings at o^1 whilst the delivery aperture p of the said conveyor is arranged to come into register, once during each rotation of the conveyor, with the delivery chute g which is carried by, and extends through the wall of, the stationary casing k as shown in Figure 1.

Having described my invention, what I claim and desire to secure by Letters Patent is:—

1. A furnace comprising a rotatable work holding drum, a frame, a stationary casing supported by the frame and surrounding a part of the drum, a stationary furnace structure surrounding the remaining part of the drum and having heating elements therein, means for normally securing the casing and furnace structure in fixed relationship, the furnace structure having a bearing associated with its outer end, a trunnion carried by the drum and rotatably engaging said bearing, and means supporting the furnace structure to permit longitudinal movement thereof in a direction away from the casing upon disconnecting the same from the casing, as and for the purpose set forth.

2. A furnace comprising a rotatable work holding drum having a trunnion upon its outer end, a frame, bearings carried by the frame and engaged with the drum, a stationary casing surrounding a part of the drum, a stationary furnace structure surrounding the remaining part of the drum and having heating elements therein, the adjacent ends of the casing and furnace structure being normally connected, the furnace structure having a bearing associated with its outer end adapted to rotatably receive said trunnion, rails, wheels carried by the furnace structure for movement on the rails, whereby the furnace structure when disconnected from the casing is adapted to travel on the rails, as and for the purpose set forth.

In testimony whereof I hereunto affix my signature.

ALFRED GLYNNE LOBLEY.