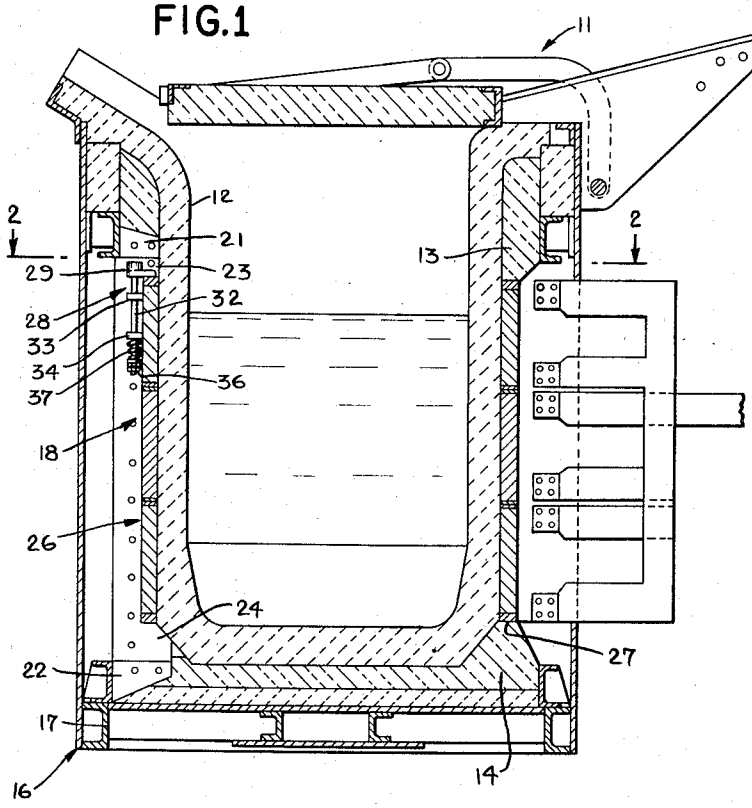
Sept. 16, 1958 O. JUNKER 2,852,587

INDUCTION FURNACE

Filed Nov. 7, 1955

FIG.1



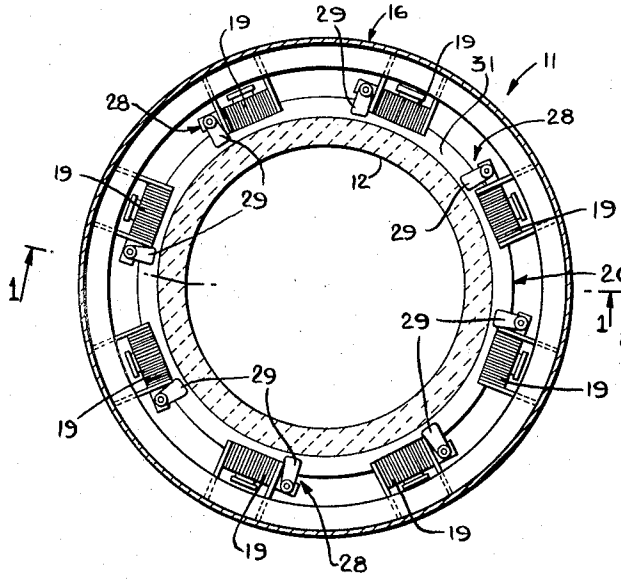


FIG.2

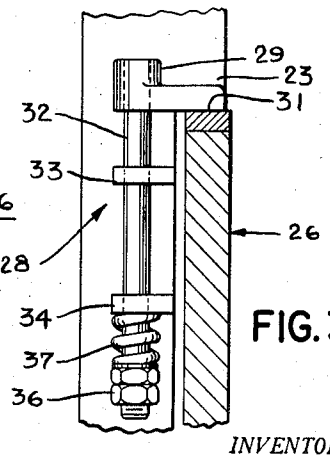


FIG.3

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INDUCTION FURNACE

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4 Claims. (Cl. 13—27)

The invention relates to electric induction furnaces, and relates more particularly to an improvement in the coil support for such induction furnaces, especially coreless metal melting furnaces operating in the low frequency or medium frequency spectra.

It is an object of the invention to provide for the holding of the windings of the coils in the proper position relative to each other, at about an equal height, to counteract any axially acting shortening or lengthening forces that the coil may be subjected to.

It is another object of the invention to provide for such holding of the windings in an elastic manner.

It is a further object of the invention to subject the windings of the coils resiliently to compression pressure in the axial direction.

Generally speaking, this is accomplished by applying the force of resilient means against one end of the coil pressing it towards the other end.

With the above and other objects of the invention in view, the invention consists in the novel construction, arrangement and combination of various devices, elements and part, as set forth in the claims hereof, one embodiment of the same being illustrated in the accompanying drawings and described in the specification.

In the accompanying drawings,

Fig. 1 is a vertical sectional view of an induction furnace provided with a coil support in accordance with the invention, taken on line 1—1 of Fig. 2;

Fig. 2 is a horizontal sectional view taken on line 2—2 of Fig. 1; and

Fig. 3 is a large scale elevational view, partly in section, showing a detail illustrated in Fig. 1.

In carrying the invention into effect in one of the embodiments which has been selected for illustration in the accompanying drawings and for description in this specification, there is provided a furnace **11** that has a crucible **12** which is composed of refractory material, such as a ramming mixture. Heat insulation members **13** and **14** surround the top and bottom portions of the crucible **12**. A frame, generally indicated at **16** supports the crucible **12**. It is formed of angle irons **17** and of sheet metal. A magnetic structure **18** is provided that includes a series of laminated iron yokes **19**, and the laminated yokes **19** are connected to the frame **16** by means of upper sheet metal strips **21** and lower sheet metal strips **22**. The laminated yokes **19** are arranged along a cylinder about the axis of the crucible **12**, and are spaced from each other at uniform distances along the cylinder orbit, and have their axes arranged radially intersecting the axis of the crucible **12**.

Each laminated yoke **19** carries near its upper end a lug **23**, and near its lower end a lug **24**, that projects towards the interior of the crucible **12**. A cylindrical induction coil **26** surrounds the major portion of the external surface of the crucible **12** and is disposed in the space that is defined between said external surface of the crucible **12** and the innermost surfaces of the laminated yokes **19**. The coil **26** rests with its annular bottom surface on a support, for instance on a raised portion **27** of the lower insulation member **14**, and extends with its upper end towards the lower portion of the upper insulating member **13**.

A plurality of means such as resiliently biased movable

yokes **28** are provided to compress the coil **26** downwardly, against the support **27**. A movable yoke **28** is connected to each laminated yoke **19**, and comprises a pressure transfer member such as a shoe **29** that rests against the upper annular surface **31** of the coil **26**. Each shoe **29** is secured to a rod **32** that is guided for vertical reciprocal movement in two brackets **33** and **34** of each laminated yoke **19**. At the lower end, each of the rods **32** has adjustably positioned a terminal member such as a nut **36**, and a compression spring **37** is disposed between the lower bracket **34** and the nut **36**, and urges the nut **36** and thereby the rod **32** and the shoe **29** downwardly. Each shoe **29** is thereby resiliently pressed downwardly onto the top surface **31** of the coil **26**, exerting a downward pressure against the coil.

As the laminated yokes **19** are uniformly spaced from each other around the coil **26**, the shoes **29** will exert a downward pressure at regular intervals, and the intervals are chosen sufficiently small so that thereby the coil **26** will be subjected to compression throughout its circumference.

The compression of the coil **26** exerted by the springs **37**, assures that the windings of the coil will be in proper position relative to each other, when the coil is shortened or elongated, for instance by heat or other forces applied thereto. This has the advantage that all of the windings of the coil will be subjected to substantially the same uniform stresses.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

Having thus described the invention, what I claim as new and desire to be secured by Letters Patent, is as follows:

1. An induction furnace operating in the spectrum of low and middle frequencies, comprising in combination, a crucible, an electric coil encircling said crucible, a series of laminated yokes spaced from each other uniformly along the periphery of said coil, and means operable for resiliently compressing axially the windings of the coil, comprising a stationary support for said coil and resiliently movable means connected to each laminated yoke biased to exert pressure onto said coil towards said stationary supports.

2. In an induction furnace, having an upright crucible and a coil encircling the external surface of said crucible and a plurality of laminated yokes spaced uniformly about said coil, in combination, a support below said coil, and a pressure transfer member connected to each laminated yoke and guided for vertical movement and engaging the top of the coil, and spring means urging each pressure transfer member resiliently in a downward direction.

3. An induction furnace, as claimed in claim 2, together with, a bearing connected to each laminated yoke, a vertical rod guided for vertical reciprocal movement in said bearing, said pressure transfer member being secured to said rod and movable therewith, and a spring biasing said rod downwardly.

4. An induction furnace, as claimed in claim 2, each pressure transfer member having an elongated portion disposed substantially radially of the coil, said members being spaced uniformly about the periphery of the annular top surface of said coil and engaging said top surface.

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