United States Patent

[11] 3,590,206

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[54] FLEXIBLE ELECTRIC TUBE BRAZING FURNACE

10 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **219/85,** 219/535
[51] **Int. Cl.** **B23k 1/04**
[50] **Field of Search** 219/85, 57, 535, 549; 338/210

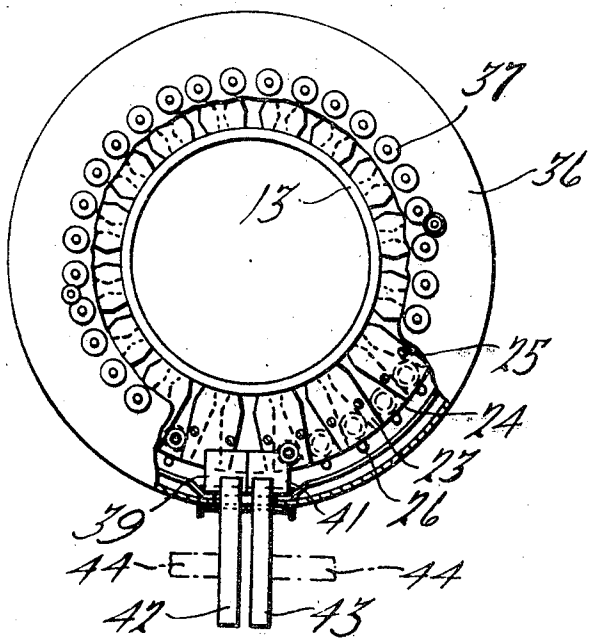
[56] **References Cited**

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2,722,597	11/1955	Steiner	219/542
3,353,005	11/1967	Sisson et al.	219/411

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Assistant Examiner—J. G. Smith
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ABSTRACT: A portable tube brazing furnace using resistance heating and incorporating means for surrounding the joint with inert gas. The furnace comprises a pair of spaced parallel link chains with ceramic rods extending therebetween and carrying the heating elements. An insulative cover is carried by the chains, and the entire unit is clamped around the joint. Combined electrical and gas conducting tubers extend into the furnace so that inert gas may surround the joint during brazing.



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SHEET 1 OF 2

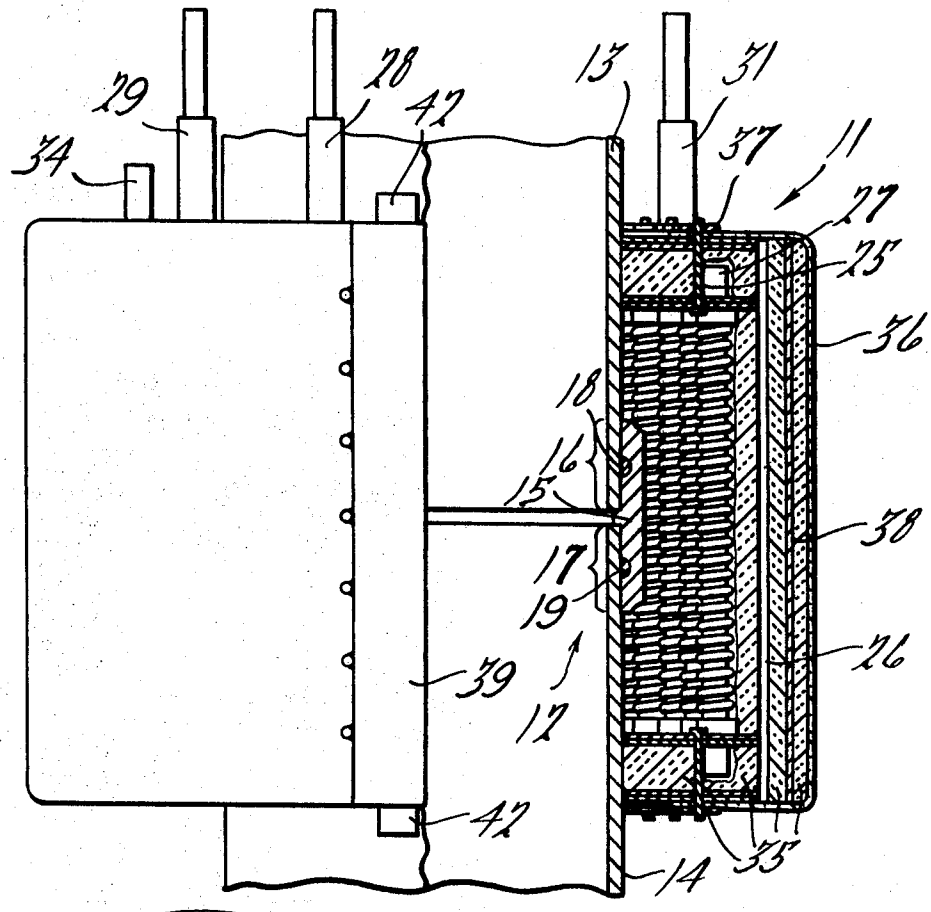


FIG. 1.

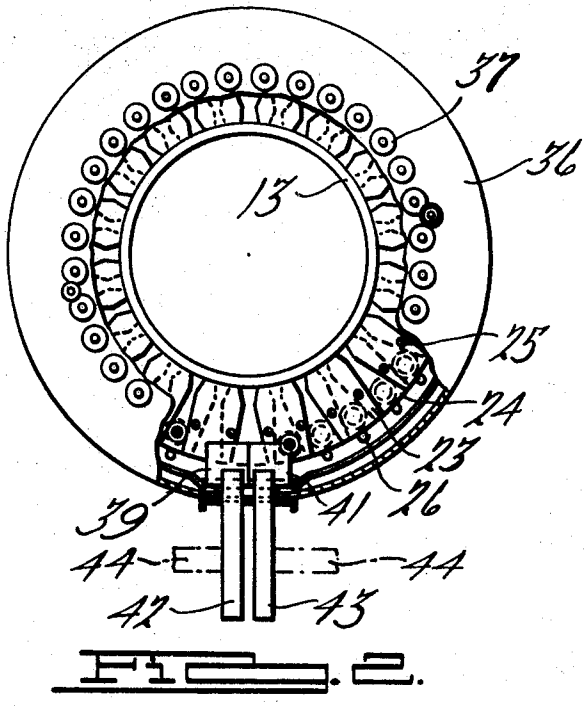


FIG. 2.

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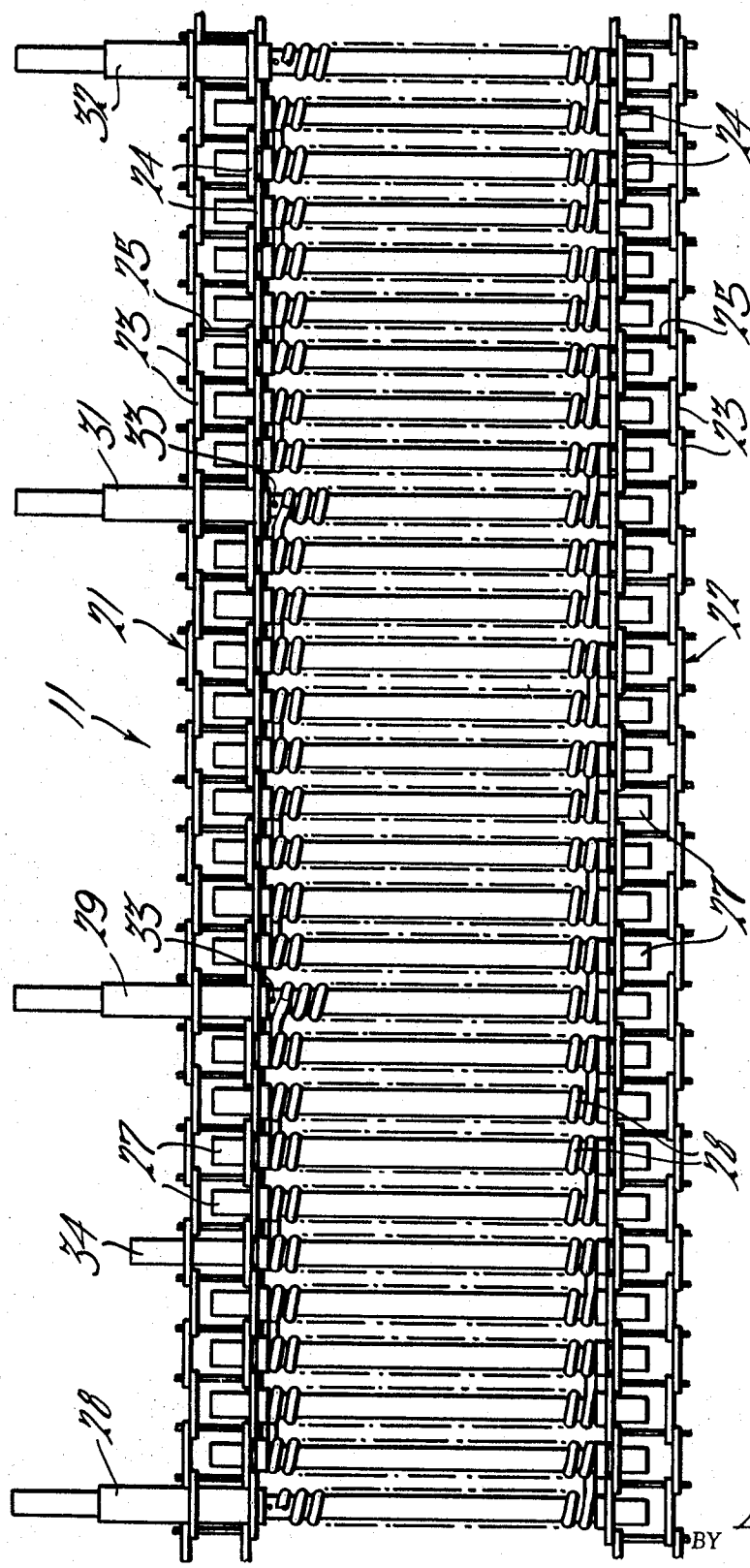


Fig. 3

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FLEXIBLE ELECTRIC TUBE BRAZING FURNACE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to brazed tube joints, and particularly to portable furnaces using resistance heating elements and which surround the joint to be brazed.

2. Description of the Prior Art

Induction-type heaters are known for tube brazing, but these are cumbersome and costly where relatively large diameter tubes are involved.

A radiant-type brazing furnace is shown in U.S. Pat. No. 3,353,005. However, this furnace has no means for creating a blanket of inert gas around the joint being brazed to inhibit surface oxidation. Furthermore, the structure of the brazing furnace in this patent involves the use of relatively fragile heating lamps.

BRIEF SUMMARY OF THE INVENTION

According to the invention, two spaced parallel double-link chains are provided with ceramic rods extending between the chains and supporting resistance heating coils. The coils are electrically connected in parallel banks by terminals which also act to conduct inert gas to the heating zone surrounding the joint. An insulative collar is mounted on the chains, the entire unit being clamped into position around the tube. The inside of the tube may also be supplied with inert gas during the brazing operation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view, partly cross sectioned, showing the furnace surrounding a joint to be brazed;

FIG. 2 is a top plan view of the furnace; and

FIG. 3 is an elevational view of the main portion of the furnace interior in a flat position, the end portions being broken away.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The furnace is generally indicated at 11 and is intended to heat the braze area of a joint such as that indicated generally at 12 in FIG. 1. This joint is for two tubes 13 and 14 and has a coupling or braze fitting 15 overlapping the tubes in the braze areas 16 and 17. Braze material 18 and 19 carried by grooves in coupling 15 is heated during the brazing process to form the joint.

The construction of furnace 11 comprises two link chains generally indicated at 21 and 22 in FIG. 3. These chains are in spaced parallel relation, each chain being composed of overlapping outer links 23 and inner links 24. The links are of flat shape and are pivoted together by hinge pins 25. Each hinge pin pivotally connects a pair of outer links 23 and a pair of inner links 24 in its respective chain 21 or 22. Connecting rods 26 are secured to the outer edges of each pair of links 23 and 24, connecting these links to their counterparts in the other chain.

Ceramic rods 27 extend between each pair of facing links 24 of the two chains and carry electric resistance heating coils 28 thereon. Three parallel banks of heating coils are shown, the coils of each bank being in series. Four members 28, 29, 31 and 32 are provided, each of these members acting as a combined electric terminal and inert gas supply conduit. The members pass through links 23 and 24 of chain 21 and are adapted to be connected to a source of electric current. Members 28—32 are hollow and have apertures 33 at their inner ends which will enable inert gas passing through the members to reach the annular chamber between furnace 11 and joint 12. The outer ends of these members are adapted to be connected to a source of inert gas. One of the ceramic rods 34 extends outwardly of chain 11 and is hollow to accommodate a thermocouple (not shown) which will sense the temperature of the element which surrounds it and, through a control circuit (also not shown) control the power source to the coils so as to prevent overheating of the joint.

Insulative material 35 surrounds and extends between chains 21 and 22. An asbestos cover 36 surrounds this insulative material and is secured to the chains by washers 37 which are held in position by peened ends of hinge pins 25. A metallic heat reflector 38 is disposed within insulative material 35 and extends around the entire furnace. The ends of this reflector are secured to the members 39 and 41 of a tongue-and-groove seal which closes the furnace when it is wrapped around coupling 12. Two pairs of clamping posts 42 and 43 extend outwardly from members 39 and 41 respectively and are in parallel relation when the furnace is in its operative position, so that the furnace may be held in place by clamps shown partially in dot-dash lines at 44 in FIG. 2.

The operation of furnace 11 will be apparent from the above description. The furnace being of the proper circumferential length to surround joint 12, it will be clamped in position so that insulative material 35 between the links of chains 21 and 22 will engage the outer surfaces of tubes 13 and 14. With tongue-and-groove members 39 and 41 in interfitting relation, a substantially closed chamber will be formed between coils 28 of the furnace and brazing areas 16 and 17.

An inert gas may be caused to flow through the interior of tubes 13 and 14, and inert gas connections may be made to members 28—32. Both the interior and exterior of the joint will therefore be substantially protected from oxidation, the inert gas from members 28—32 flowing into the furnace interior dissipating through the insulative material.

Electrical current flowing through resistance coils 28 will create sufficient heat to braze joint 12. In a typical construction, furnace 11 is capable of attaining a heat 2000 F which is substantially higher than the melting temperature of a conventional brazing material 18 and 19, such as a silver braze alloy. The furnace will automatically align itself to slight irregularities in the connection between tubes 13 and 14 and will require no mechanical adjustment during use. No coolant is of course required during the brazing cycle, and the furnace will operate on either AC or DC.

What I claim:

1. In a portable electrical resistance tube brazing furnace, a pair of spaced parallel link chains, insulative rods extending between said chains, heating coils mounted on said rods, a plurality of terminals extending from one of said chains and connected to said coils, insulative material surrounding and extending between said chains outwardly of said rods, and means for clamping said furnace in position wrapped around a joint to be brazed.

2. The combination according to claim 1, said terminals being hollow and adapted to carry inert gas to the annular chamber formed between said coils and joint.

3. The combination according to claim 1, said rods being formed of ceramic material, one of the rods being hollow and adapted to receive a thermocouple for controlling the furnace power supply.

4. The combination according to claim 3, each of said link chains having an inner and outer pair of links connected by hinge pins, said rods passing through the inner links thereof.

5. The combination according to claim 1, each of said link chains having an inner and outer pair of links connected by hinge pins, said rods passing through the inner links thereof.

6. The combination according to claim 1, further provided with an asbestos cover surrounding said insulative material, hinge pins connecting inner and outer links of each of said chains, and washers held by the outer ends of said hinge pins and securing said cover in position.

7. The combination according to claim 1, each of said link chains having inner and outer links, corresponding links of both chains being connected by a rod secured to the outer edges thereof.

8. The combination according to claim 1, said clamping means comprising a pair of clamping posts extending outwardly from said furnace and adapted to be drawn together by clamps.

9. The combination according to claim 8, further provided with an asbestos cover surrounding said insulative material.

10. The combination according to claim 9, each of said link chains having an inner and outer pair of links connected by hinge pins, said rods passing through inner links thereof.