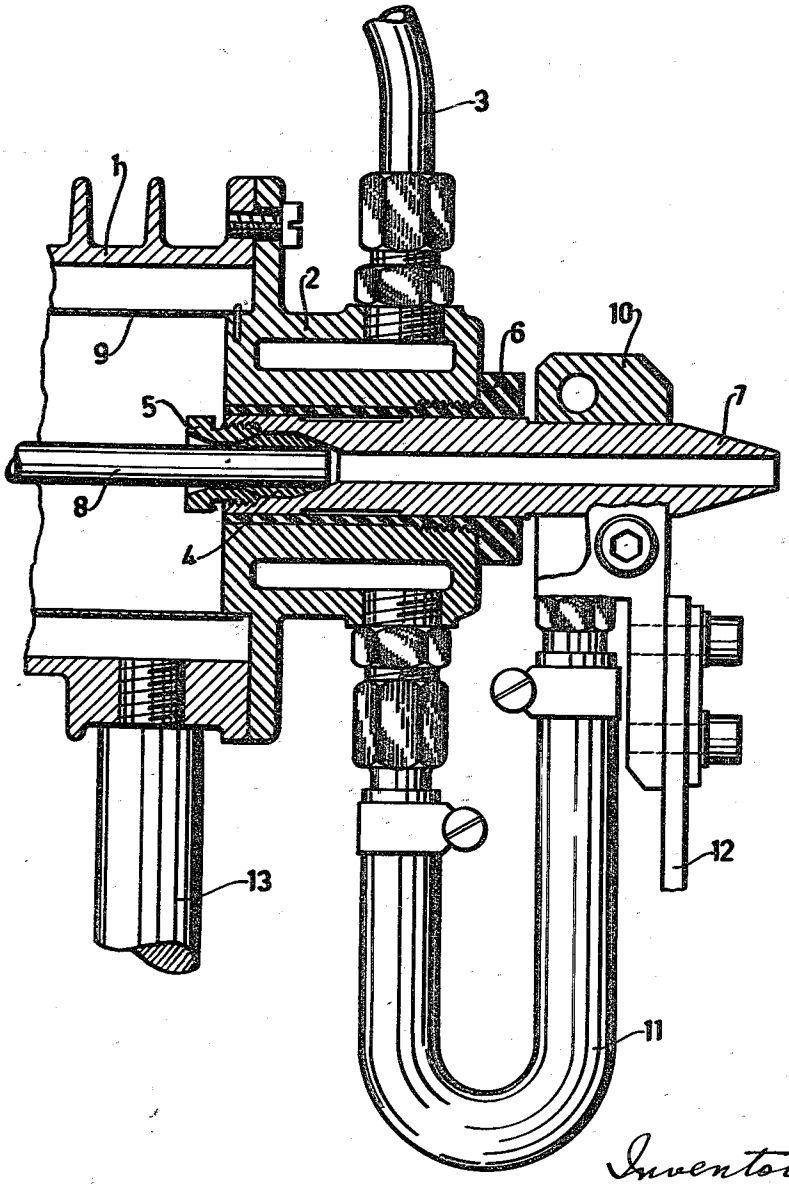
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TUBULAR ELECTRIC FURNACE OF THE RESISTANCE TYPE

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TUBULAR ELECTRIC FURNACE OF THE RESISTANCE TYPE

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The present invention relates to tubular electric furnaces of the resistance type and has for its general object the provision of an improved arrangement for securing and maintaining close and effective electrical contact between the furnace tube and the leads for supplying current thereto for heating purposes.

In electric annealers of a high temperature type, the furnace space the interior of which consists of a tube of a suitable metal heated by direct passage of the current, special difficulties are encountered in providing for good and lasting electric contact between the metal tube and the contact piece of the current lead. A variety of designs have been used, e.g., a slit tube has been squeezed elastically into a pierced contact piece. The tube has also been hard-soldered to the contact piece. The last-mentioned method is impaired by the disadvantage—besides a certain fragility appearing with the tube—that changes of tubes are made more difficult, if the same contact piece is desired to be used more than once. In the former case, providing for easy changes of tubes, there is, however, the risk of the elastic sliding contact deteriorating by weakening spring action of the slit part and of the oxidation of the contact surface contributing to changes in the contact resistance, sparking, etc., which influence the life and operating characteristics of the furnace.

The present invention is intended to remove these disadvantages, precluding the deformation of the furnace tube and at the same time providing for good electric contact. According to the invention, the ends of the furnace tube, each provided with a metal cone, are fitted into corresponding conical metal seats in electric contact pieces and pressed against these seats, for instance by means of nuts, at least one contact piece being slidably disposed in a surrounding mounting sleeve so that the contact piece can move together with the tube longitudinally of the axis of the tube, influenced by the increase in the length of the tube caused by the increase in temperature taking place when current flows through the tube.

Oxidation is precluded by the good, firm and close electrical contact between the ends of the tube and the contact pieces, and no sparking or welding ensues. The temperature of the furnace can be kept constant in a more appropriate manner, since the contact resistances of the furnace tube can be kept constant.

One embodiment of a device realizing the invention is shown in the attached drawing, partly in a longitudinal section. The drawing shows only the right end of the device, the left one being formed essentially in the same manner.

1 in the drawing designates an outer furnace envelope forming part of a housing structure for enclosing the furnace tube, conveniently provided with cooling flanges and supported by pillar 13. Within the envelope and radially spaced therefrom, a radiation shield in the shape

of a jacket 9 may be arranged. The heated furnace tube itself is to be seen at 8, at its ends (the left end being formed essentially in the same manner) being provided with firmly arranged metal pressure contact elements 4, conveniently of copper and a double-conical shape. The conical end of the tube is fitted into a corresponding conically turned seat in a metal contact piece 7 and is pressed against this seat by means of a nut 5, which is also conical inside at one of its ends in order to fit onto the cone 4. The contact piece 7 is hollow, so that a wire, e.g., a tungsten or a molybdenum wire, may be passed through the contact piece 7 and the tube 8 and out through the contact piece of the other end, undergoing an annealing treatment during the passage through the tube. Heating the tube is effected by the current passing through it. The current is fed from a contact bar 12 and a contact clip 10 to the contact piece 7 and is transferred therefrom to tube 8 by the conical seat and the cone 4. At the opposite end of the tube, the current connection is effected in the corresponding way. During heating the tube 8 enlarges longitudinally, and in order to avoid deformation ensuing therefrom, the tube end and the contact piece 7 are allowed to move longitudinally of their axes to a certain extent, the contact piece operating in a surrounding sleeve 6 (which is of electrically insulating material) by sliding fit. This sleeve 6 is fixed in a jacketed end wall 2 also forming a part of the housing structure, which is preferably water-cooled. The water is fed into the cooling channel of the jacket through a flexible hose 11 and is drained off through a discharge-pipe 3. The inlet of the hose 11 is not shown in the drawing. The hose is flexible in order to admit of relative movements of the contact piece 7 and the sleeve 6.

What we claim is:

1. In a tubular electric furnace of the resistance type, an open ended furnace tube adapted to be heated by the passage of electric current therethrough, a housing structure encircling said tube in spaced relationship thereto, means for supporting said tube within said housing structure and comprising a tubular contact piece, clamping means for detachably connecting said tube in pressure contact engagement with said contact piece, said contact piece extending through the wall portion of said housing structure, an electrically insulating sleeve for separating said contact piece from said housing structure, said sleeve engaging one of the parts separated thereby and being in sliding engagement with the other of said parts for permitting axial movement of the assembly of said tube and said contact piece relative to said housing structure to compensate for thermal expansion and contraction of said tube, and means for supplying electric current to said contact piece externally of said housing structure, said clamping means including an internal conical seating surface within said tubular contact piece and a tubular pressure contact element around an end portion of said furnace tube and having a conical end surface mating with said internal conical seating surface and a nut around said furnace tube in threaded engagement with said contact piece for forcing said contact piece and said pressure contact element and said furnace tube into pressure engagement with each other.

2. Apparatus as defined in claim 1, in which said pressure contact element is double conical in form and said nut is threaded into the bore of said contact piece and is

provided with an internal conical seating surface engaging one of the conical surfaces of said pressure contact element to compress the element into pressure contact with said tube.

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