Dec. 23, 1952 J. YOUNG 2,623,080

ELECTRODE RETAINER

Filed Oct. 5, 1950

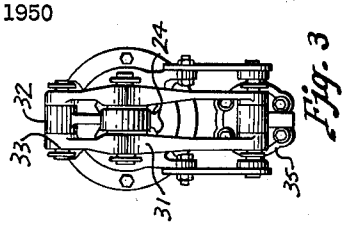


Fig. 3

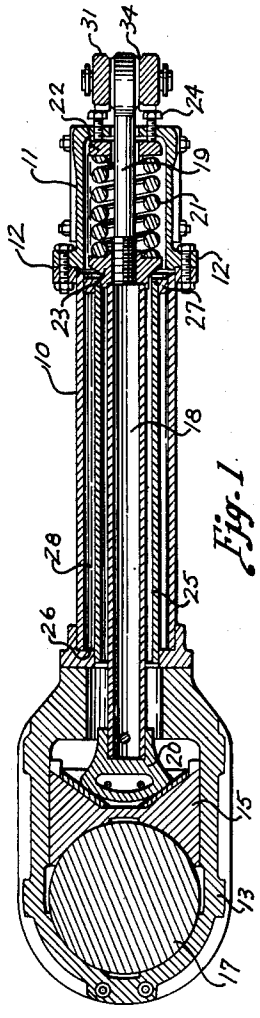


Fig. 1

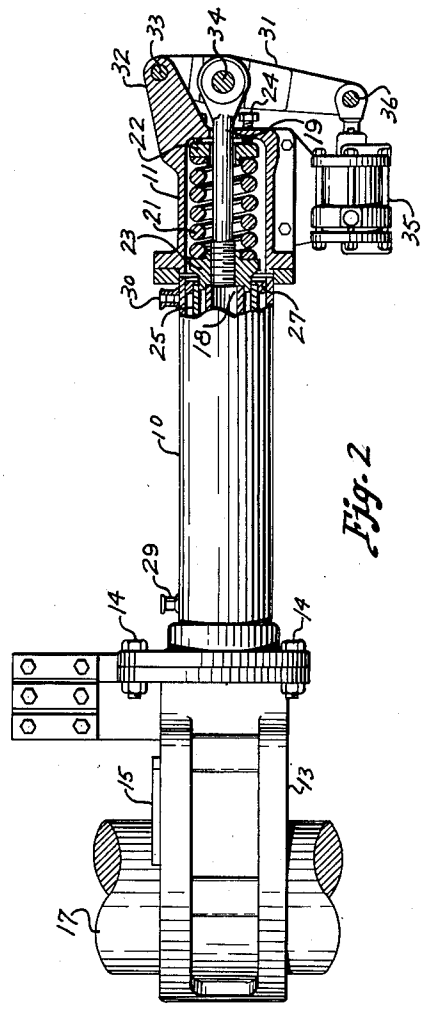


Fig. 2

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Patented Dec. 23, 1952

2,623,080

UNITED STATES PATENT OFFICE

2,623,080

ELECTRODE RETAINER

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Application October 5, 1950, Serial No. 188,615

1 Claim. (Cl. 13—16)

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This invention relates to improvements in a holder for securing graphite carbon or other electrodes in position within an electric furnace of the type that automatically compensates for variations in the clamping pressure due to heating of the parts during operation. Compensation is usually achieved by spring means.

The pressure compensating electrode holders of the prior art tend to become very hot during operation or alternatively have relatively complicated cooling arrangements. The particular construction of holder that I have devised is very simple and can be cooled by means of a water jacket. This overcomes undue heating of the holder at a relatively low cost and in an efficient manner.

It is then the object of this invention to provide an electrode holder for use in an electric furnace or the like in which the clamping rod can adjust itself longitudinally as the need arises during operation and which can be simply and economically water cooled.

With these and other objects in view, an electrode holder according to my invention has a tubular casing with a U-shaped electrode clamp on one end thereof. A sectional thrust rod extends through the casing and is spring urged into clamping relation with an electrode in the clamp. The spring operates on the rear section of the thrust rod and the fore section of the rod has a cooling jacket around it. The rod can be withdrawn by a manually operated lever system from clamping engagement against the pressure of the clamping spring. The invention will be clearly understood after reference to the following detailed specification read in conjunction with the drawings.

In the drawings:

Figure 1 is a sectional plan view of an electrode holder according to my invention.

Figure 2 is a side elevation of the electrode holder with the casing broken away adjacent its rear end to show construction.

Figure 3 is an end view of the electrode holder.

Referring to the drawings, the electrode holder there shown comprises a casing formed from a tube-like fore section 10 and a cup like rear section 11, bolted together as at 12. A U-shaped clamp member 13 is rigidly bolted to the fore end of the casing as at 14 and slideably accommodates a clamp slide 15 formed to mate with an electrode 17 placed within the U-shaped clamp member 13. A rod, formed from a fore section 18 and a rear section 19 is reciprocably mounted within the casing and has a thrust head 20 for co-action with the clamp slide 15.

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The thrust head 20 of the rod is forced against the clamp slide 15 of the clamp member to clamp the electrode 17 rigidly within the U-shaped clamp 13 by the spring 21. Spring 21 is compressed between the bearing surface on annular disk member 22 and the surface of a projecting shoulder of a ring 23 that threadedly engages on the rear section 19 to the rod. The annular disk 22 is supported with respect to the bottom of the rear section 11 of the casing through the set screws 24. Set screws 24 can be adjusted to vary the compression of spring 21.

A sleeve 25 is rigidly mounted within the casing in spaced relation between the fore section 18 of the rod and the fore section 10 of the casing by means of flange 26 on the member to which the U-shaped clamp member 13 is secured and by means of the annular ring member 27 to form a cooling water jacket 28. Jacket 28 is formed with an inlet opening 29 and an outlet opening 30 through which water can be circulated to cool the holder during use.

The forward section of shoulder washer 23 is formed for sliding engagement within the sleeve 25 during operation. It should perhaps be noted that enough clearance should be provided between these two parts to eliminate binding due to the arcuate motion of the free end of rear section 19 of the rod during operation where it connects with actuating lever 31.

The annular ring member 23 and the annular disk 22 are spaced apart from each other to compress the coil spring 21 that encircles rear section 19 of the rod and force the thrust head 20 of the rod against the clamp head 15 of the clamp into clamping engagement with an electrode 17 placed within the U-shaped clamp member 13.

In operation, the uneven expansion of the electrode and clamp components occurs and is compensated for by the resiliency of the spring 21. The extent to which the spring 21 is compressed can be adjusted by means of the set screws 24.

For the purpose of releasing an electrode held within the U-shaped clamp member by the spring urged rod, I provide a lever 31 which pivotally connects with an arm 32 on the casing of the holder as at 33 and which pivotally connects with the free end of the rear section 19 of the rod as at 34, and a means for actuating the free end of the lever 31.

In the drawings, I show a hydraulic cylinder 35 pivotally mounted to the rear section 11 of the casing for operating the lever 31. The piston rod of hydraulic cylinder 35 pivotally connects with the free end of lever 31 as at 36.

During operation, water is circulated through the jacket **28** for the purpose of cooling the electrode holder.

From the above it will be apparent that the pressure with which an electrode holder is retained in a clamp as described is substantially constant at all times, any difference in expansion between the clamp and the electrode being automatically compensated for by the spring **21**. My arrangement for urging the electrode from the clamp is also thought to have considerable merit over the prior art because it can be operated from a point remote from the furnace. The water cooling of my electrode holder is also thought to be of considerable advantage.

Embodiments of the invention other than the ones shown in the drawings will be apparent to those skilled in the art and I do not intend that my patent should be limited by the specific embodiment shown.

What I claim as my invention is:

An electrode holder comprising a sectional casing having a fore and a rear section, said fore section being tubular, said rear section being cupped, the edges of said cupped section connecting with one end of said tubular section; an electrode clamp mounted at the other end of said tubular section; a sleeve within said tubular section substantially co-extensive therewith; and means for rigidly mounting said sleeve within said tubular section and for forming a seal between the interior of said tubular section and the exterior of said sleeve adjacent both ends of said sleeve whereby to define a jacket for cooling water in the foresection of said casing; a

sectional rod reciprocably mounted within said casing, said rod passing through said sleeve, one free end of said rod co-acting with said clamp to close it; said cupped portion of said casing having a hole formed in the bottom thereof, the other end of said rod extending through said hole; spring means housed within said cupped portion of said casing; said rod having a fore section and a rear section, said fore section of said rod being substantially co-extensive with the fore section of said casing, said rear section of said rod having a shoulder for engagement by said spring means housed in the rear section of said casing, said spring means being loaded to urge said rear section of said rod into engagement with said fore section of said rod; and means for releasing said spring pressure on the rear section of said rod.

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