United States Patent [19]

Kogl

[11] **3,771,776**

[45] **Nov. 13, 1973**

[54] **HEAT TREATMENT APPARATUS**

[75] Inventor: **Wolfgang Kogl,** Dusseldorf-Oberkassel, Germany

[73] Assignee: **DSD Dillinger Stahlbau GmbH,** Dusseldorf, Germany

[22] Filed: **Apr. 13, 1972**

[21] Appl. No.: **243,745**

[30] **Foreign Application Priority Data**

Apr. 14, 1971 Germany ..... P 21 17 948.6

[52] **U.S. Cl.** ..... **266/6 S,** 148/146

[51] **Int. Cl.** **C21d 1/62**

[58] **Field of Search** ..... 134/144, 148, 149, 134/151, 153, 172, 180, 198, 199; 266/4 R, 4 S, 6 R, 6 S; 148/146

[56] **References Cited**

FOREIGN PATENTS OR APPLICATIONS

1,252,715 10/1967 Germany ..... 266/6 S

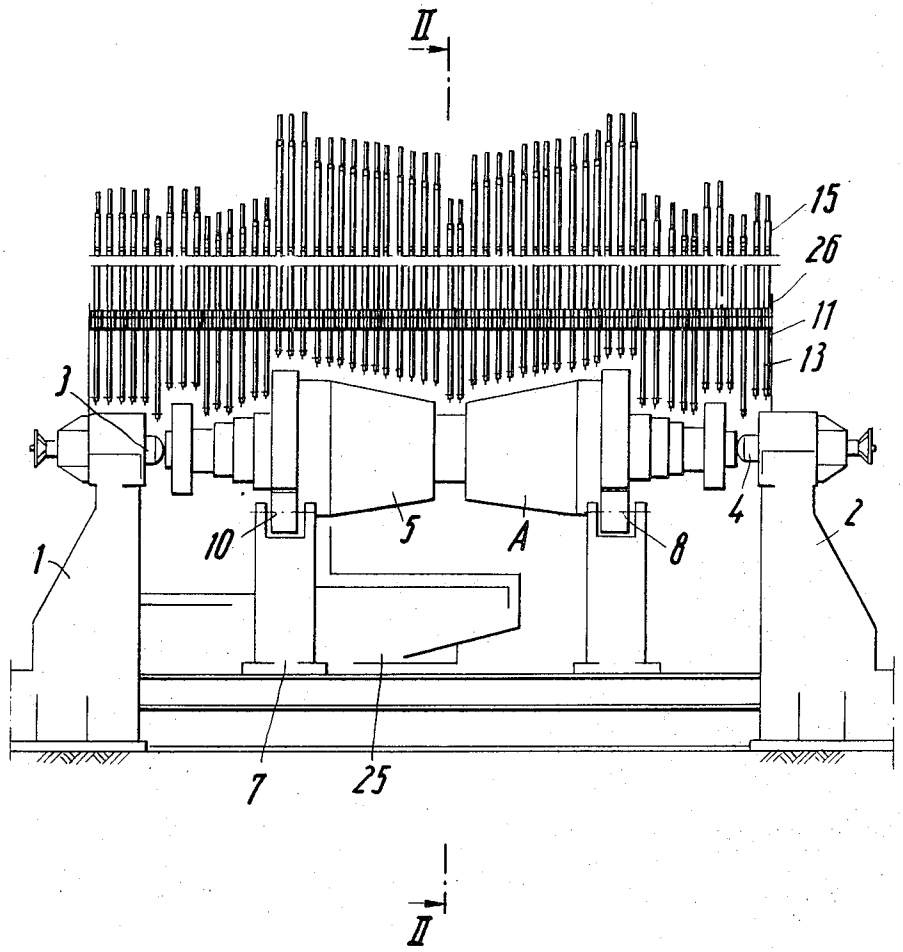
Primary Examiner—Gerald A. Dost

Attorney—Frederick E. Lange et al.

[57] **ABSTRACT**

An improved spray heat treatment apparatus for heat treating axially symmetrical bodies of metal in which the distance between the spray nozzles and the body to be treated is easily adjustable. The invention includes an elongated tubular member having a spray nozzle at one end which is axially movable with respect to a stationary housing. The housing includes means for supplying the medium to be sprayed to the tubular member and thus the spray nozzle for any axial position of the tubular member.

9 Claims, 5 Drawing Figures



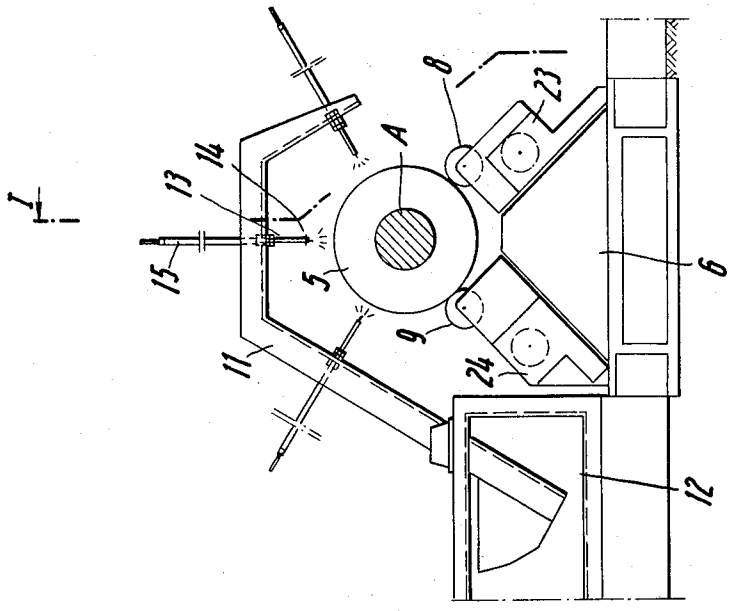


Fig. 2

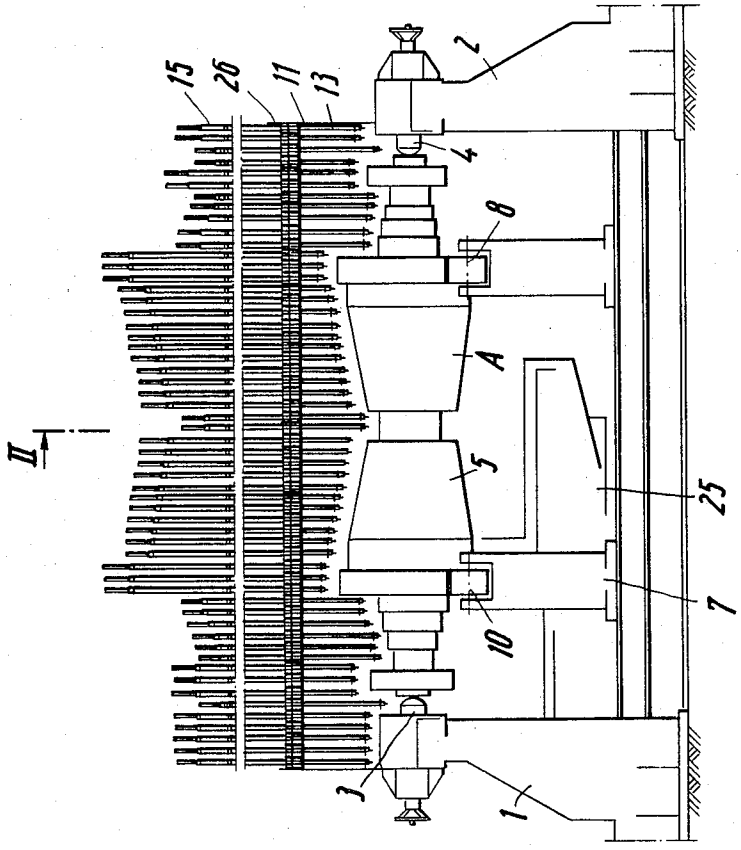


Fig. 1

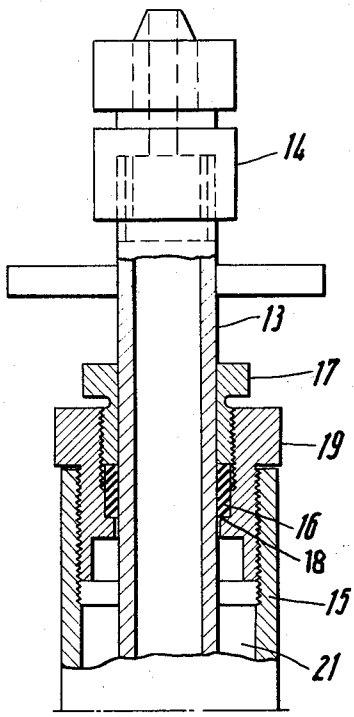


Fig. 4

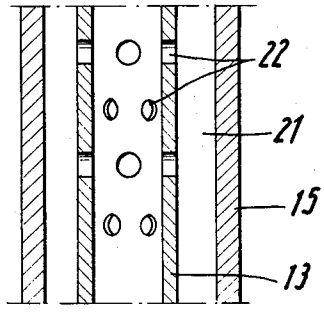


Fig. 5

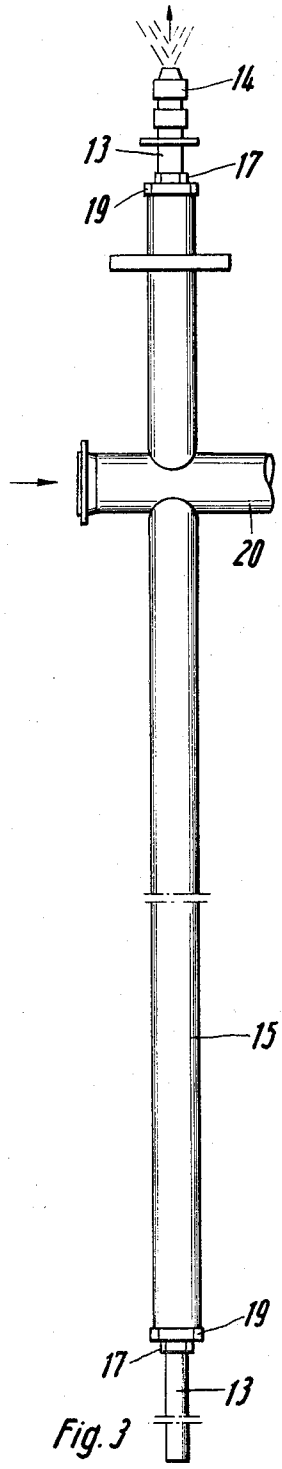


Fig. 3

HEAT TREATMENT APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates generally to an improved apparatus for the spray-heat treating of metals, and more specifically to an improved apparatus for the spray-heat treating or tempering of an axially symmetrical, particularly multi-contoured metal body.

In the field of the present invention, heat treatment is accomplished by exposing the body to be treated to the spray medium issuing from a plurality of nozzles. Because the bodies to be treated are often multi-contoured bodies, it is important, for a high-quality job of heat treating, that the various nozzles be adjustable so that the distance of the nozzles from the work piece may be varied. In the past, the adjustment of the position of the nozzles with respect to the work piece was accomplished by securing the spray nozzle with their tubes in a holder such that the various nozzles and tubes could be interchanged. Because of the exchangeability of the various tubes, a longer or a shorter tube could be used, depending upon the diameter of the axially symmetrical metal body to be treated. Thus, by using the correct length of tube, the optimum radial distance from the spray nozzle to the metal body to be treated could be obtained. This method of exchanging the spray nozzles with the tubes, however, was rather cumbersome, and required the stocking of a large number of nozzles with different tube lengths.

SUMMARY OF THE INVENTION

The problem presented by the prior art and solved by the present invention is the providing of a spray-heat treatment apparatus of the above described type where the radial distance from the spray nozzles to the axially symmetrical metal body to be treated can be adjusted in a simple manner.

In contrast to the prior art, this problem is solved according to the present invention by providing the tube of each spray nozzle to be axially displaceable and lockable with respect to the metal body in a housing sealed from the outside and carried by a relatively stationary holder which has a connection for the feed line. The tube contains a plurality of orifices which are so arranged that they are inside the housing in any possible axial adjustment of the tube.

The spray-heat treatment apparatus according to the present invention permits the continuous radial adjustment of the spray nozzles with respect to the body to be treated without keeping nozzles with various tube length in stock, which have to be exchanged. Since the housing for the tube of each nozzle is fixed, without impairing the radial adjustability of the spray nozzles. This is of advantage as far as the construction and sealing is concerned.

Preferably the tube carrying the spray nozzle is guided at the points at which it extends from the housing by stuffing boxes. This guidance results, on the one hand, in a tight seal, and on the other hand, it permits the selective displacement of the tubes in the housing. To make sure that the tubes can be easily displaced and are held immovably after the adjustment, the stuffing boxes can be braced axially again at the tube by axially acting bracing means.

In another embodiment of the invention the spray nozzles with their tubes and housing can be secured in the holder in one or several rows staggered angularly around the metal body. Preferably the holder is designed as a supporting arm and can be swung out of its operating position above the metal body.

The objects and advantages of the present invention will be described more fully below with reference to the drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of the spray-heat treatment apparatus of the present invention as viewed along the line I–I of FIG. 2.

FIG. 2 is a plan view of the spray-heat treatment apparatus of the present invention as viewed along the line II–II of FIG. 1.

FIG. 3 is a plan view of a spray nozzle and tube extending through a housing.

FIG. 4 is a plan view partially in section of the connecting means between the spray tube and housing.

FIG. 5 is a cross sectional view of the central part of the spray tube and housing.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference first to FIG. 1 and 2, the spray-heat treatment apparatus of the present invention includes a support stand having two end blocks 1 and 2 which engage a multi-contoured axially symmetrical metal body 5 which is to be heat treated. The metal body 5 is contacted at its end faces by the tips 3 and 4. The tips 3 and 4 are adjustable in an axial direction to secure the body 5 to be treated in the proper axial position and to prevent axial displacement of the body 5. Between the end blocks 1 and 2 are two roller blocks 6 and 7 which are adapted to support the body 5. Mounted on each of the roller blocks 6 and 7 are a pair of movable carriages 23 and 24 which rotatably support the rollers 8, 9 and 10 which are in turn adapted to carry and support the metal body 5. Although not specifically illustrated in the drawings, it should be noted that there is a second roller 10 corresponding to the illustrated roller 10 of FIG. 1 as the roller 9 corresponds to the roller 8 shown in FIG. 2. The carriages 23 and 24 are movably mounted to the roller block 6 and 7 in a manner in which they can be adjusted radially in the direction of the main axis A extending between the tips 3 and 4. This adjustment permits the mounting of metal bodies 5 with varying diameters so that the axis of the metal body 5 will coincide with the main axis A. Although not specifically illustrated, at least one of the roller blocks 6 or 7 is coupled or associated with a driving motor to permit the metal body 5 to be set in rotation.

The support stand further includes means for supporting a plurality of spraying assemblies in a spraying position. This means includes a supporting arm 11 extending over the metal body 5 which is pivotally mounted in the part 12. More specifically, the supporting arm 11 is secured by two substantially U-shaped arms mounted in the part 12 to permit the support means to be pivoted out of its operating position and includes three support brackets 26 which are axially parallel to the main axis A. The support brackets 26 of the supporting arm 11 carry three straight rows of spraying assemblies each of which includes a housing 15, a tube or elongated tubular member 13 and a spray nozzle 14 arranged at one end of the tube 13 and di-

rected toward the metal body 5. Each of the tubes 13 is closed at its other end.

As illustrated more clearly in FIGS. 3 and 4, each of the tubes 13 is axially movable and adapted to extend through or traverse the preferably cylindrical housing 15 which is immovably secured to the support bracket 26 of the supporting arm 11. Each of the housings 15 is sealed at both ends from the tube 13 by a stuffing box which comprises a sleeve 19 having a collar or shoulder portion 18, a threaded nipple 17 and a packing 16. The sleeve 19 is a relatively annular shaped member having external threads on a portion which is adapted to correspond with internal threads in the cylindrical housing 15. The nipple 17 is likewise annular in shape and includes external threads adapted to correspond to internal threads in a portion of the sleeve 19. When properly disposed, the packing 16 extends around the tube 13 and between the end portion of the nipple 17, the inner surface of the sleeve 19, and the shoulder portion 18. By screwing the nipple 17 into the sleeve 19, an axial force or bracing is exerted on the packing 16 thus causing the packing 16 to be radially braced against the inside surface of the sleeve 19 and the tube 13 to immovably secure the tube 13 in the housing 15 and to seal the connection between the tube 13 and the housing 15. With this connecting means, the axially movable tube 13 may be selectively secured to the housing 15 to permit the selective adjustment of the axial position of the tube 13 and thus the distance between the spray nozzle 14 and the metal body 5.

Connected with each of the housings 15 is a connection 20, which is associated with the feed line for the medium to be sprayed. During operation, the medium to be sprayed is fed into the annular portion 21 (FIG. 5) of the housing 15 through the connection 20. From the annular portion 21, the fluid then flows through the orifices 22 formed in the surface of the tube 13 and into the interior of the tube 13. From here, the medium is forced through the tube 13 and out through the spray nozzle 14. It should be noted that the orifices 22 are arranged so that they are within the housing 15 and between the stuffing boxes at the ends of the housing 15 for any operative adjustment of the position of the tube 13.

As illustrated in FIGS. 1 and 2, the spraying assembly support means comprising the part 12, the supporting arm 11 and the support brackets 26 are arranged so that the spraying assemblies are supported in three rows parallel to the axis of the body to be treated with the three rows being angularly staggered around the body to be treated. To prepare the apparatus of the present invention for operation, all of the threaded nipples 17 are initially loosened so that the tubes 13 may be adjusted in a radial direction with respect to the metal body 5. After adjusting each of the tubes 13 to the contour of the metal body so that the desired distance between the spray nozzles 14 and the surface of the metal body 5 is obtained, the threaded nipples 17 are tightened thus securing the tubes 13 with respect to the cylindrical housings 15 and sealing the connections between each tube 13 and its respective housing 15. Because of the relatively simple procedure for adjusting the distance of the spray nozzle 14 from the surface of the metal body 5, virtually any desired cooling effect such as a uniform or a locally more intensive cooling effect can be achieved.

In addition to permitting the infinite radial adjustment of each of the tubes 13 with the spray nozzles 14 relative to the metal body 5, the tight clamping or immovable associations between the housings 15 and the support bracket 26 permits the spray medium to be fed to the individual housing 15 over common non-flexible feed lines secured on the supporting arm 11 which in turn are fed from high pressure hoses. The fixed laying of the feed lines and the relative immobility between the feed lines and the connection 20 insures a minimum danger of leaks even after prolonged use.

Although the description of the preferred embodiment of the present invention has been quite specific, it is comtemplated that changes could be made from this detailed description without deviating from the spirit of the present invention. Thus, it is applicant's intention that the scope of the present invention should not be limited by the specification but rather should be dictated by the appended claims.

I claim:

1. An improved apparatus for heat treating an axially symmetrical body comprising:
   - a support stand adapted for rotatably supporting the body to be treated;
   - means associated with said stand for rotating the body to be treated;
   - a plurality of spray assemblies supported in a spraying position by said support stand with each spray assembly including;
   - a housing fixedly secured to said support stand,
   - an elongated tubular member having a spray nozzle at one end and being axially movable through said housing such that a portion of said tubular member is disposed within said housing, said tubular member further having an orifice in the portion disposed within said housing to permit communication between the interior of said housing and the interior of said tubular member,
   - connecting means for sealing the connection between said tubular member and said housing and for selectively securing said tubular member to said housing to permit the selective adjustment of the axial position of said tubular member and the distance between said spray nozzle and the body to be treated, and
   - means for supplying the medium to be sprayed to the interior of said housing.

2. The apparatus of claim 1 wherein said connecting means is a stuffing box.

3. The apparatus of claim 2 wherein said tubular member is guided by said stuffing box.

4. The apparatus of claim 2 wherein said stuffing box includes an axially acting bracing means which causes a radial bracing against said tubular member.

5. The apparatus of claim 1 wherein said housing is cylindrical.

6. The apparatus of claim 1 wherein said tubular member includes a plurality of orifices which are arranged so that they are within said housing for any operative adjustment of the position of said tubular member.

7. The apparatus of claim 1 wherein said support stand includes a spraying assembly support means for supporting said spraying assemblies in a row parallel to the axis of the body to be treated.

8. The apparatus of claim 7 wherein said spraying assembly support means is adapted for supporting said spraying assemblies in a plurality of rows angularly staggered around the body to be treated.

9. The apparatus of claim 7 wherein said spraying assembly support means is pivotally connected to said support stand enabling said spraying assembly support means to be pivoted out of its operating position.

* * * * *