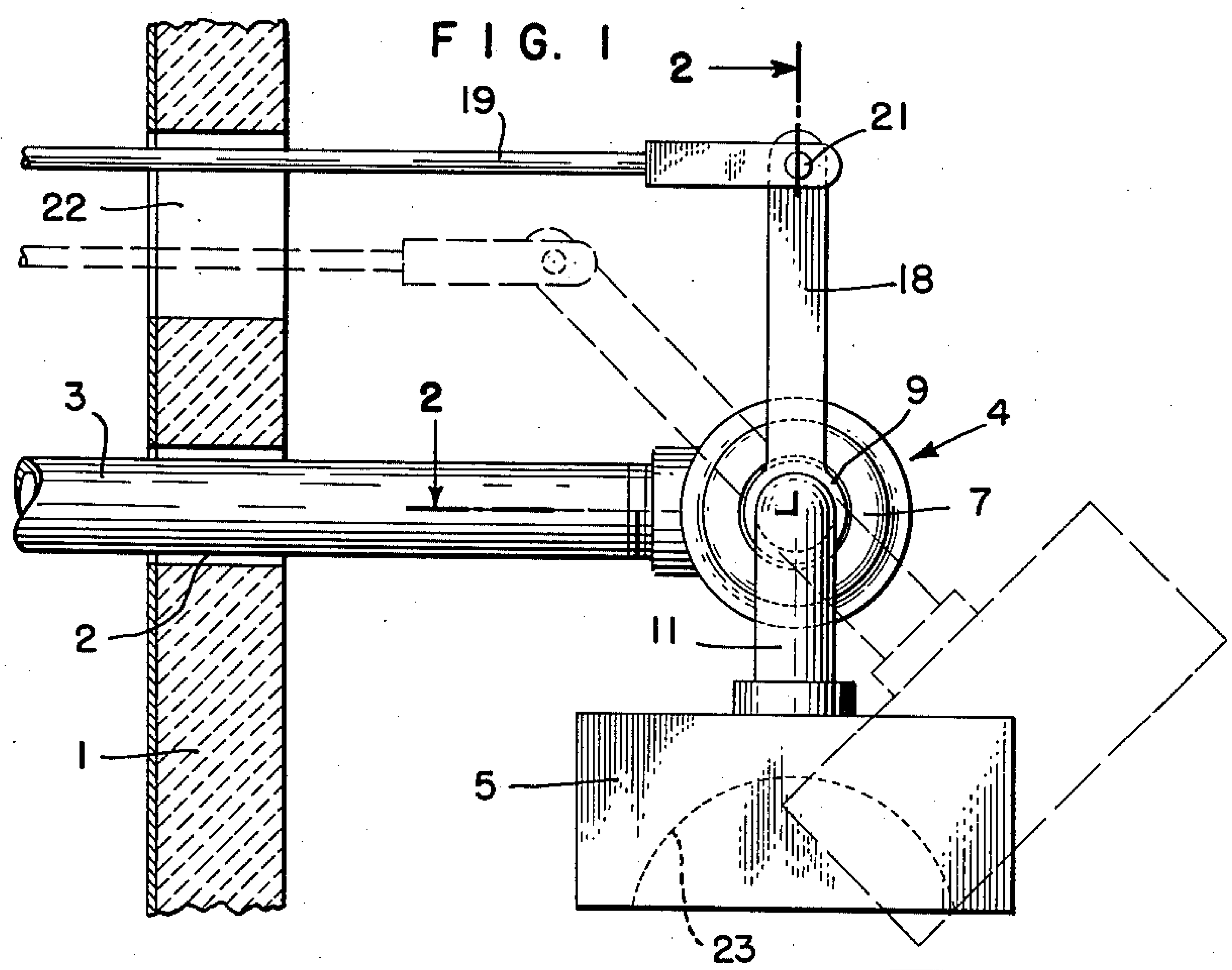
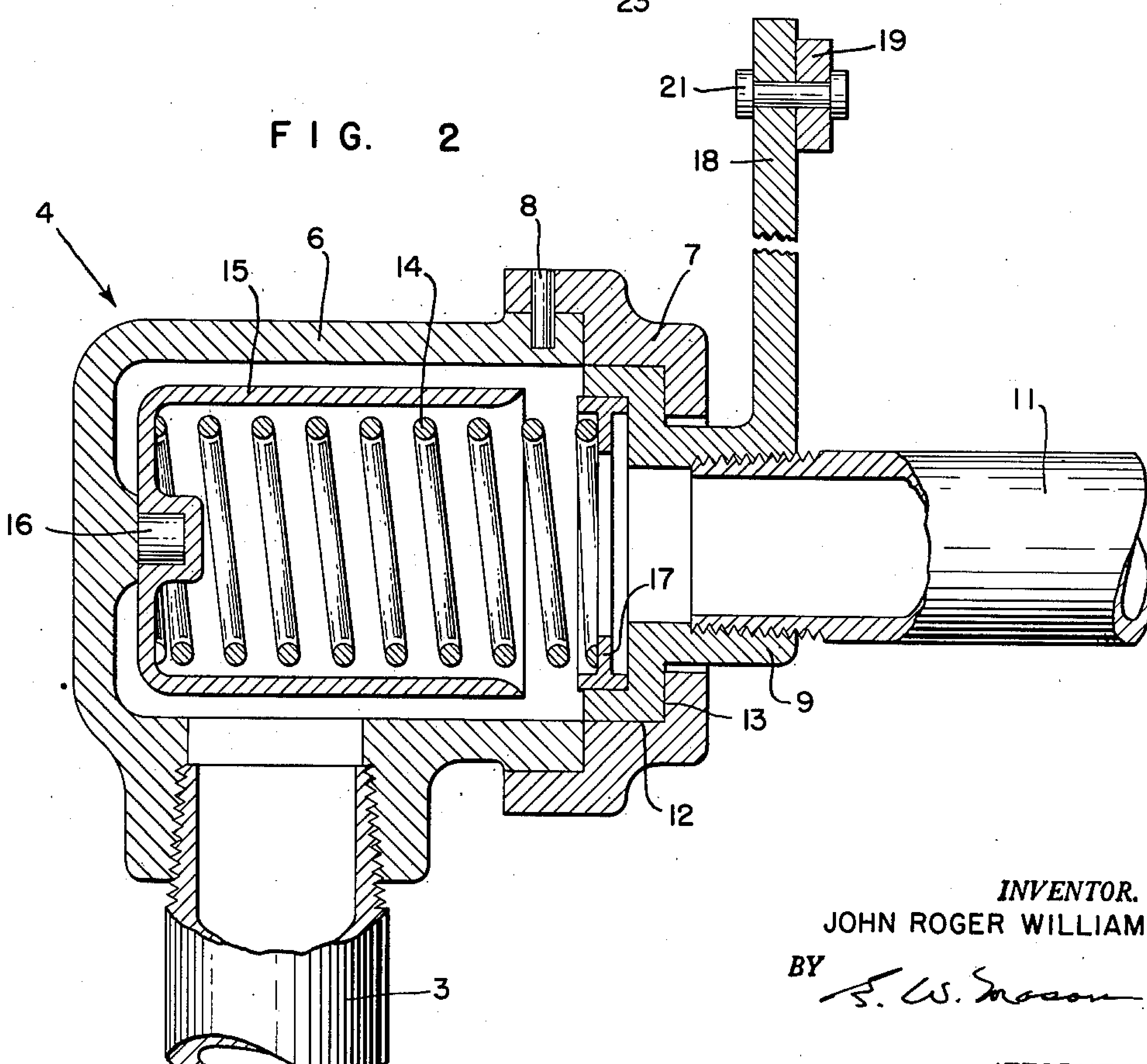
GAS BURNER AND HIGH TEMPERATURE ROTARY JOINT

Filed Nov. 2, 1960

F I G. 1



F I G. 2



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United States Patent Office

3,101,772

Patented Aug. 27, 1963

3,101,772

GAS BURNER AND HIGH TEMPERATURE ROTARY JOINT

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Filed Nov. 2, 1960, Ser. No. 66,840
6 Claims. (Cl. 158—99)

The present invention relates to rotatable joints, and more particularly to a rotating joint through which a fuel mixture can be supplied to a burner located in a hot furnace.

In various heating applications, it is desirable to have additional heat directed toward specific portions of a piece of work being heated in a furnace. This can be accomplished by inserting a burner in the furnace and directing it toward the work. Because of the configuration of the furnace or the work, or both, it is often necessary to adjust the burner on its support.

Prior to this time, it has been quite difficult to provide a joint through which fuel flows to the burner in the furnace, which will stand up under furnace heat. The rotating seal, which is required in the adjustable part of the support, either freezes or leaks after a short time in the furnace, so that in the latter case fuel is not supplied in the required amounts, if at all, to the burner.

It is an object of the present invention to provide a rotary joint that is designed to be used in a high temperature atmosphere. It is a more specific object to provide an adjustable support for a burner that is located in a furnace.

In carrying out the invention, there is provided a relatively stationary part that is supplied with fuel. A relatively movable part that has a burner mounted thereon is carried by the stationary part. The joint between these parts is kept sealed by a spring which is protected from the heat by a radiation shield that is, in turn, cooled by the fuel flowing through the apparatus.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, however, its advantages and specific objects attained with its use, reference should be had to the accompanying drawings and descriptive matter in which I have illustrated and described a preferred embodiment of the invention.

In the drawings:

FIG. 1 is a view showing a burner support extending through a furnace wall, and

FIG. 2 is a section on line 2—2 of FIG. 1.

Referring to the drawings, there is shown a portion of a furnace wall 1 which has in it an opening 2. Support 3, in the form of a pipe through which fuel flows, extends through the opening 2 into the furnace. This pipe supports on its outer end the rotary joint 4, with which the invention is particularly directed, that in turn supports a burner 5 to provide supplemental heat to a specific portion of work that is placed in the furnace.

The rotary joint 4 includes a stationary casing 6 that is substantially cylindrical in shape, and which is threaded to the end of the supporting pipe 3. The open end of this casing is partially closed by an annular cap 7 that is tightly fastened thereto by a series of pins 8, for example. Received within the opening of cap 7 is a rotatable member 9 upon which the burner is rigidly supported by an elbow 11. The cap or ring 7 is provided with an axially extending bearing face 12 and a radially extending bearing face 13, which are engaged by similar faces formed on the exterior of rotat-

ing member 9. A suitable high temperature lubricant, such as lead plate, is placed between the surfaces 12 and 13 and the complementary surfaces on the rotating member. The rotating member is held against surface 13 tightly enough to form a pressure tight joint by means of a compression spring 14. A radiation shield in the form of a cup 15, that extends for a distance substantially equal to the length of the casing 6, surrounds spring 14 for substantially its entire length. This cup is of a diameter slightly smaller than the casing 6, and is held in axial alignment in this casing by means of a depression in its bottom that receives a pin 61 extending from the base of casing 6. One end of spring 14 bears against the end of cup 15, while the other end of the spring engages with minimum contact a ring 17 that is fitted in rotating member 9 as best shown in FIG. 2 of the drawing.

The member 9 can be rotated with respect to casing 6 by means of an arm 18 that extends radially therefrom. The outer end of this arm is pivoted to a rod 19 by a suitable pin 21. Rod 19 extends through a slot 22 which is provided in the furnace wall, so that the burner can be adjusted from outside the furnace.

In the operation of the apparatus, the support 3 is extended through the opening 2 until the burner 5 is positioned at the proper point with respect to the work that is to be heated in the furnace. Fuel, preferably in the form of a gas-air mixture, flows through pipe 3 into casing 6. From here the fuel flows around cup 15 and through member 9 to elbow 11 and the burner. The flow of fuel through casing 6 and around cup 15 will cool this cup, so that the interior of the casing is maintained at a relatively low temperature compared to the temperature outside the casing. The cooling provided on cup 15, combined with the fact that this cup serves as a radiation shield between casing 6 and spring 14, will keep the interior of the cup and the spring 14 at a sufficiently low temperature, so that the spring will retain its tension. With the various parts of the apparatus made of suitable alloy, it can be used in a furnace heated to at least 1400° F. In such a furnace, spring 14 will be kept below 800° F., which is the tempering temperature of spring steel. The area between cup 15 and the interior of the casing is small enough so that the pressure head of the fuel is changed to velocity head, thus giving an increased cooling effect by the flow of the fuel mixture around the cup.

When it is desired to adjust burner 5 with respect to casing 6, it is only necessary to move rod 19 in an axial direction. The burner can then be shifted, for example, from its full to its dotted line position of FIG. 1. As illustrated herein, the burner 5 is of the radiant cup type in which the fuel mixture is burned along the surface of a cup indicated at 23. This cup is heated to incandescence, and radiant heat is directed with a spotlight effect towards a specific portion of work to be heated. Thus supplemental heat can be added to the work at some desired point.

The rotary joint of the present invention operates well in a high temperature environment, and has the ability to be adjusted easily while it is hot. Since the spring 14, which is used both to maintain a gas tight seal between member 9 and ring 7 and to hold the burner in its adjusted position, is protected from the heat of the furnace by cup 15, which serves as a radiation shield, in addition to the flow of the relatively cool fuel mixture through the joint, the temper of the spring is not harmed by the heat, and the joint will be kept tight at all times.

While in accordance with the provisions of the statutes, I have illustrated and described the best form of embodiment of my invention now known to me, it will be apparent to those skilled in the art that changes may be made in the form of the apparatus disclosed without departing from the spirit and scope of the invention set forth in the appended claims, and that in some cases certain features of my invention may be used to advantage without a corresponding use of other features.

What is claimed is:

1. In a rotary joint, the combination of a cylindrical casing having an opening in one end thereof, an annular member in said opening, said casing and member being provided with cooperating radially extending flanges shaped to prevent movement of said member from said casing, a compression spring in said casing, means to locate said spring to force said flanges together, means to supply a fluid to said casing to flow outwardly through said member, a shield surrounding said spring and between said casing and spring, said shield being spaced from both said casing and spring, said supply means directing fluid between said shield and casing, and means to rotate said member relative to said casing.

2. A rotary joint for use in a high temperature environment including a hollow casing having an opening therein and a radially extending surface surrounding said opening and facing the interior of said casing, an annular member extending from the exterior thereof through said opening, a radial flange having a second surface to cooperate with said surface extending outwardly from the portion of said member in said casing, a spring means to mount said spring in said casing to force said surfaces together, a shield spaced from said casing and extending between said casing and spring, and means to direct fluid through said casing and around said shield and out through said annular member.

3. In a rotary joint, a hollow casing having an opening in one end thereof and a face opposite said open end, said casing being provided with an annular radially extending surface around said opening on the interior thereof, an annular member extending through said opening and having an annular radially extending surface engaging said first mentioned surface, means to force said surfaces together including a cup-shaped element smaller in diameter than said casing, means to support said element with its closed end abutting said face of said casing opposite said opening and axially aligned therewith, a compression spring in and substantially surrounded by said element and having one end abutting the end of said element and the other end abutting said member to force said surfaces against each other, means to rotate said member, and means to supply a fluid to said casing to flow between said element and casing and out said member.

4. In a rotary joint, a substantially cylindrical hollow casing having an opening in one end, a bearing surface on said casing around the interior of said opening, an annular member extending through said opening and provided with bearing surfaces engaging the bearing surfaces on said casing, a resilient means including a spring in said casing forcing the surfaces on said casing and member in engagement with each other, a shield extending between said spring and the interior of said casing and spaced from said casing, means to supply a fluid to said casing to flow between said shield and casing and through said member, and means to rotate said member relative to said casing.

5. The combination of claim 4 in which said means to supply fluid to said casing is a support adapted to hold the casing in a furnace and the fluid is a fuel, a burner, means to support said burner on said member, and means adapted to be operable from the exterior of a furnace to adjust said means to rotate.

6. Apparatus for movably supporting a burner in a furnace chamber including a tubular support adapted to extend into the chamber, a hollow cylindrical casing on said support with the interior of the casing communicating with the interior of said support, an annular member extending axially from one end of said casing, cooperating surfaces on said casing and member serving to prevent said member from being removed from said casing, a burner carried by said member in a fixed position relative thereto, fuel being adapted to flow through said support, casing and member to said burner, a spring, means to mount said spring in said casing to force said surfaces together and thereby prevent leakage of fuel between them, a radiation shield substantially the length of said spring located in said casing between and spaced from both said casing and spring, means to direct fuel as it flows to said burner between said shield and casing, and means to rotate said member and burner relative to said casing, said last mentioned means being adapted to extend beyond the chamber.

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