R. D. CONRAD & J. GEHRING.

BURNER.

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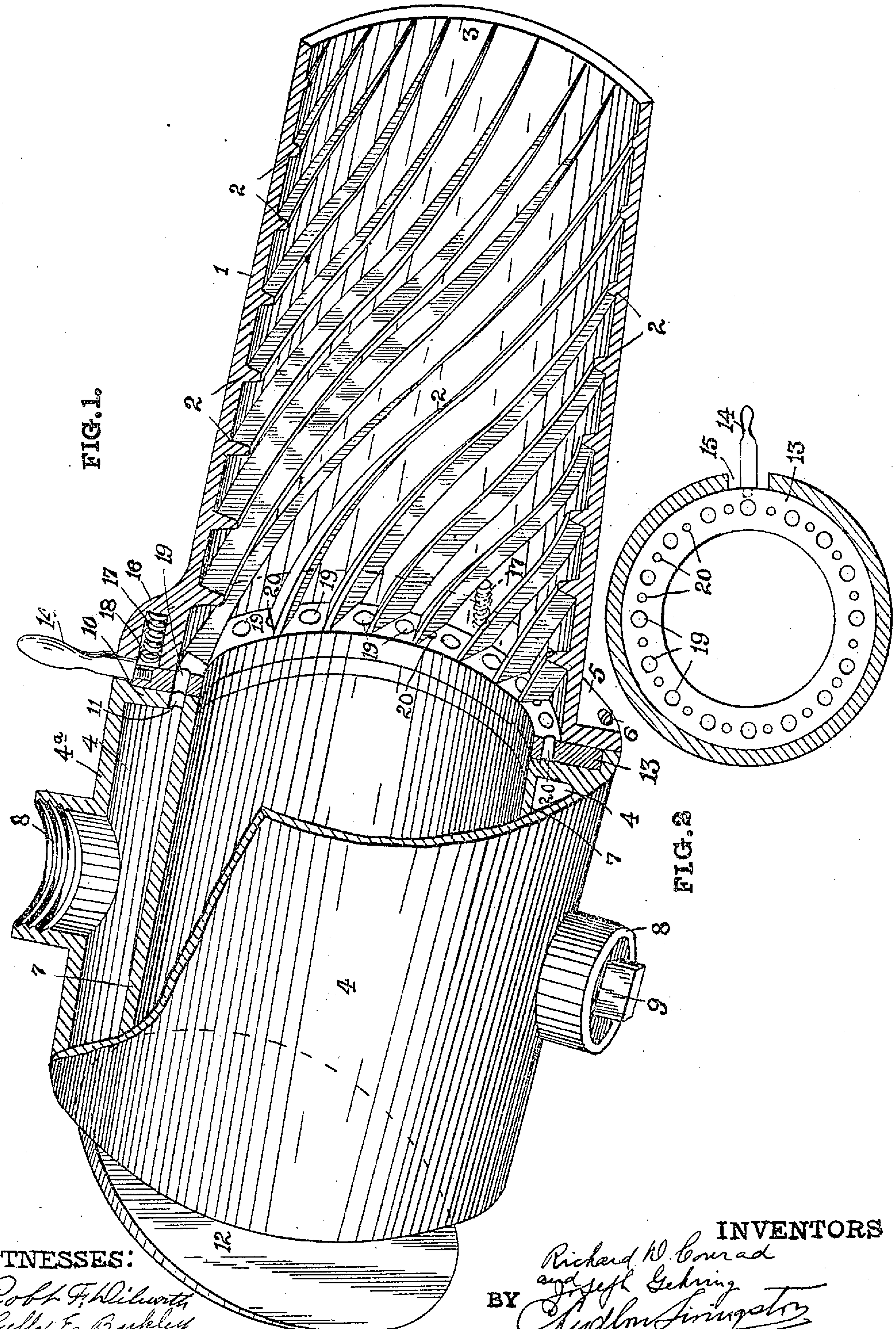
943,917.

Patented Dec. 21, 1909.



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RICHARD D. CONRAD AND JOSEPH GEHRING, OF PITTSBURG, PENNSYLVANIA; SAID GEHRING ASSIGNOR, BY MESNE ASSIGNMENTS, TO WINNER NATURAL GAS BURNER COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

BURNER.

943,917. Specification of Letters Patent. **Patented Dec. 21, 1909.**

Application filed May 25, 1908. Serial No. 434,796.

To all whom it may concern:

Be it known that we, RICHARD D. CONRAD and JOSEPH GEHRING, citizens of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Burners, of which the following is a specification.

Our invention relates to burners and particularly to burners adapted for use with gas or other hydro-carbon fuel.

Our improved burner is particularly adapted for use in furnaces and the like where a large and well mixed supply of gas is required to be fed thereto.

The object of our invention is to provide a burner of high efficiency and one which may be adapted to varying supply of gas, which objects we accomplish by the novel means hereinafter described for varying the openings through which the gas is admitted to the mixer tube.

In the accompanying drawings which form part of this specification: Figure 1 is a perspective view of our improved burner partially broken away to show the interior thereof. Fig. 2 is a face view of the regulating disk with the adjacent portion of the casing in cross section.

Referring again to the drawings for a detailed description of our invention: The mixer tube or nozzle 1, tapered slightly as shown, is provided on its interior surface with the raised walls or ribs 2 winding spirally along the length of said interior surface of the mixer tube and tapering toward the outlet end 3, as shown, so that the bore of the mixer tube as outlined by the innermost edges of the said spiral walls or ribs 2 is of uniform diameter, while the bore of the mixer tube measured by its interior wall is tapered toward the nozzle outlet 3. A gas reservoir 4, attached to the mixer tube 1 by a suitable flange 5 on the end of said mixer tube, and suitable screws 6, is composed of an outer shell 4^a and an inner cylindrical shell or wall 7, the ends of said outer and inner shells being joined together to form said gas reservoir 4 entirely closed except for the inlet nipples 8 adapted to be selectively connected with the supply pipe, not shown, one of said nipples being plugged, when not connected, by the plug 9. The inner face 10 forming one end wall of the said gas reservoir 4 is provided with a series of perforations 11 of uniform size and preferably uniformly spaced around said face so that said perforations 11 are in line with the grooves in the nozzle tube formed by the aforesaid spiral walls 2. The inner cylindrical shell 7 is open at both ends to admit air therethrough to the nozzle tube and the disk 12 is pivoted at the rear end of said cylindrical shell to regulate the amount of air admitted to said cylinder.

An annular disk 13 is seated in a recess formed between the face 10 and the flange 5 and is free to be rotated therein, a handle 14 being attached to said annular disk 13 to move same in a rotary direction, the movement of said annular disk being limited by the extent of the slot 15 in the casing or shell 4^a. Lugs or bosses 16 are provided adjacent the flange 5 to receive spiral springs 17 within the recesses 18 in said bosses 16. The relative position of these springs is shown by the one appearing at the section line of Fig. 1 and by the spring shown in dotted outline in said figure. The purpose of these springs is to maintain the annular disk 13 in tight contact with the wall 10. The said annular disk 13 is provided with perforations 19 and 20 alternating as shown clearly in Fig. 2. The perforations 19 are of such size as to coincide or aline with the perforations 11 in the wall 10 when the handle 14 is in the proper position therefor, thus providing for an unrestricted flow of gas from the reservoir 4 through perforations 11 and the alined perforations 19 to the grooves formed between the spiral walls 2. When the handle is moved to the other end of the slot 15 the perforations 20, which in practice we prefer to make much smaller than the perforations 19, are brought opposite the perforations 11, thus permitting only a restricted flow of gas through said perforations 11 and 20 to the grooves or channels in the mixer tube or nozzle 1. It will be apparent that still further series of perforations may be introduced into the annular disk 13 or an additional annular disk with other series of perforations may be superimposed upon said annular disk for the purpose of further controlling the quantity of gas admitted to the mixer tube. It will be seen from the drawings Fig. 1 that when one series of perforations 19 or 20 is

in line with the perforations 11 that the other series is opposed to the solid portion of the face or wall 10.

In operation the air either under atmospheric pressure or under forced draft is admitted through the bore of the cylinder 7 to the mixer tube. The gas from the gas reservoir 4 passes through the perforations 11 and thence through the perforations 19 or 20, depending upon the position of the handle of the annular disk and into the grooves or channels formed by the spiral walls 2 which control the directional flow of the gas jets issuing circumferentially into the mixer-tube and where it receives a whirling motion which tends to throw the said gas outwardly by a centrifugal movement toward the inner wall of the tube 1. By this motion the gas is allowed to mix with the inflowing air only in a finely divided state so that by the time it reaches the end 3 of the nozzle it is thoroughly mixed with the air and is then fed from the burner as a perfect mixture ready for combustion. As already explained the spirals 2 as they approach the opening 3 diminish in depth until at the opening 3 they practically disappear so that at this point the gas and air leave the mixer tube most intimately mixed, producing a highly efficient fuel.

It will be apparent that the purpose of the spiral channels formed by the ribs or walls 2 is not merely to give the gas a whirling motion to mix it with the air, but the primary function of these spiral channels is to provide separate ways for the fine streams or jets of gas issuing from the perforations to spread out the gas in a finely divided state around the inner walls of the mixer tube where it may the more readily be taken up by the inflowing air to form a perfect mixture. For this purpose the taper to the channels formed by the spiral walls or ribs is an important element in our improved burner.

It will also be apparent that the spiral walls of our mixer tube may be dispensed with, the arrangement of perforations and the rotary disk remaining the same to perform their functions as a regulating means for varying the flow of gas, this arrangement being of value where the pressure of gas in the supply line is sometimes much higher than at other times.

Having thus fully described our invention we claim as new and desire to protect by Letters Patent of the United States:

1. In a burner, the combination of an air tube, a gas reservoir surrounding said air tube and having circumferential perforations adjacent one end of said air tube, a mixer tube attached to said end of the air tube, and an annular disk provided with series of perforations adapted to be selectively alined with the perforations in the gas reservoir, substantially as described.

2. In a burner, the combination of an air tube, a gas reservoir surrounding said air tube and having perforations adjacent one end of said air tube, a mixer tube attached to said end of the air tube and having tapered spiral ribs forming separate channels extending from said perforations, and an annular disk provided with series of perforations adapted to register with the perforations in the gas reservoir, substantially as described.

3. In a burner, a mixer-tube or tip, an air tube delivering centrally of said tip, a gas reservoir delivering circumferentially of and substantially parallel with the inner wall of said tip, and an annular disk surrounding said air tube and having openings of different sizes to vary the gas supply.

4. In a burner, a mixer-tube or tip, an air tube delivering centrally of said tip, a gas reservoir delivering a plurality of jets circumferentially of said tip, an annular disk having openings of different size to vary the flow of gas, and means in said tip to control the directional flow of the gas jets and impart a whirling motion thereto.

In testimony whereof we have affixed our signatures in presence of two witnesses.

RICHARD D. CONRAD.
JOSEPH GEHRING.

Witnesses:
A. H. KAUFMAN,
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