March 17, 1970 R. MEIER 3,500,774

MEANS FOR CUTTING HARD CONSTRUCTION MATERIALS

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FIG. 1

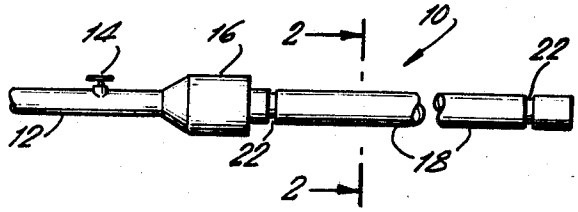
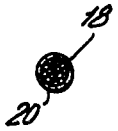


FIG. 2



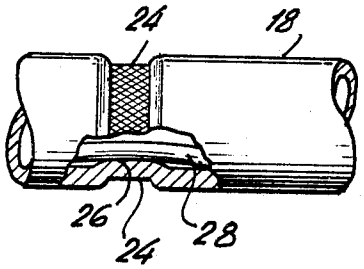


FIG. 3

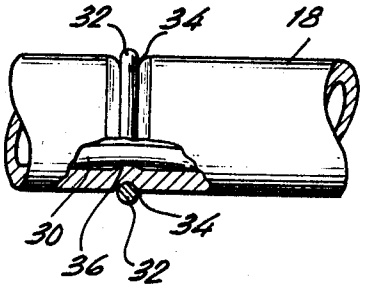


FIG. 4

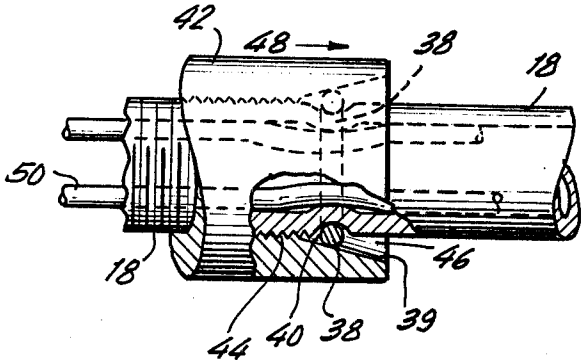


FIG. 5

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MEANS FOR CUTTING HARD CONSTRUCTION MATERIALS

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Int. Cl. F23b 7/00; F23d 21/00

U.S. Cl. 110—1 3 Claims

ABSTRACT OF THE DISCLOSURE

A torch constructed as tube of steel, iron and the like material having therein fastened lengthwise weldable wires. Oxygen is passed through the tube and wires, whereby the ignited tube burns away at its end and the resulting heat burns holes according to melting process in hard materials such as concrete, rock, cast iron and the like. A feature is that the tube has at least one annular groove which extends into the interior of the tube and by contracting acts clampingly on the wires and gives a reduction of the cross section for the flow of oxygen.

This invention is a continuation-in-part of the application of Robert Meier, Ser. No. 724,016, filed Apr. 25, 1968 for "Means for Cutting Hard Construction Materials."

The present invention concerns burners for burning holes in concrete, rock, cast iron or other materials of hard structure, which consist of a tubular steel or iron envelope in which wires of weldable material are inserted and through which oxygen flows and is burned at one end.

In the burning of holes with such a burner the tube is slowly rotated and lightly struck against the material of hard structure. In order that the wires do not change their positions in the envelope and the flow of oxygen between the wires and through the tube always remains the same, it is important to secure these wires to the tubular envelope.

For this purpose it has already been proposed to strike separate indentations into the outer tube from outside, which exert lateral pressure on the wires, and to press a cylindrical tube into a triangular cross section after the insertion of the wires. A further proposal is to bend the wires one or more times before insertion into the tube, so that they lock one another laterally in the tube. These methods of securing on the one hand are too little under control and on the other hand are complicated and expensive to achieve.

To overcome these disadvantages, a burner in accordance with the present invention comprises a burner for burning holes in materials of hard structure such as concrete, rock, cast iron and the like, comprising a cylindrical metal tube having weldable wires extending longitudinally therein, said tube having at least one annular groove which acts as a constriction in the interior of the tube and clamps the wires in position.

Various exemplary embodiments of the invention will now be described with reference to the accompanying drawings in which:

FIGURE 1 shows an elevation of an apparatus incorporating a burner in accordance with the invention.

FIGURE 2 a cross section through the burner tube of FIGURE 1,

FIGURE 3 shows on a larger scale an elevation partly in section of part of the burner of FIGURE 1,

FIGURE 4 shows the same view of an alternative form of burner, according to the invention, and

FIGURE 5 shows in similar view a further form of a burner according to the invention.

In FIGURE 1 are illustrated the most important parts of a known torch **10** for burning holes in concrete namely the oxygen supply pipe **12** with the regulating cock **14**, the connecting and holding member **16** for the burner **18**, which burner takes the form of a tube filled with longitudinal wires **20** as shown in FIGURE 2. In accordance with the invention the burner **18** has annular grooves **22** which serves for holding the wires **20** fast in the tube.

Various ways in which these grooves may be formed are illustrated in FIGURES 3–5 and the production of which is more fully described below.

In the embodiments shown in FIGURE 3, the groove **24** consists of an annular deepening produced in known manner, e.g. the lathe, by swaging, which presents knurling on its surface. For the production of this deepening, a known tool which presents three swaging rollers opposite one another, the spacing of which is decreased gradually and during the operation of rotation around the tube can be employed. The depth of the groove **24** is made so great that the inward deformation of the tube caused by the external pressure in the operation leads to a constriction **26** of the internal cross section of the tube **18** and at the same time to clamping fast of the wires **20**.

In the embodiment shown in FIGURE 4, after insertion of the wires **20** in the tube **18** a heated ring **32** is drawn on to the tube which ring contracts as it cools. This so-called shrinking process, which is well known, gives rise to large forces which result in the formation of the groove **34** and at the same time the constriction **36** of the tube **18** and thus the clamping of the wires **20**.

In the embodiment of FIGURE 5, again a ring **38** is drawn on to the tube **18**. In this example, the groove **36** can be pre-turned to small depth and the ring again be drawn on hot, the shrinking not however causing any change of form of the tube enclosure. Drawing on hot only serves for the mounting of the ring **38**. Actual pressing is produced by a sleeve **39** which has screw engagement **44** with the tube **18** and the end of which presents a conical widening **46**. As the ring **38** cannot escape from the groove **40**, it is compressed during an axial movement of the sleeve in the direction of the arrow, by the conical narrowing of the sleeve **39**. This pressing can be continued by movement of the sleeve **39** until the wires **20** have been sufficiently clamped by the internal constriction so produced.

The sleeve can be a component of the connecting and holding member.

The burner tube can have one or more of the annular grooves described, according to its length. Preferably there are two annular grooves spaced between 8 and 15 cm. and situated near the end of the tube inserted in said supply line. Both annular grooves situated one after another cause an increased jet action of the oxygen.

In working with known burners of this type it has been found that the provision of kinks in the inserted wires or irregularity in the disposition of indentations over the whole length of the tube results in disturbed oxygen flow in the tube. This is avoided by the arrangement according to the invention because the internal symmetry of the tube is not affected by the annular groove. When making the annular grooves there is a reduction of the internal cross section of the tube and the core material in the interior of the tube is deformed and clustered together without resulting in a shifting of the wire material in axial direction. The result is a substantial reduction of the flow cross section for the oxygen. The best results were obtained when the flow cross section at the constricted part is 25–65%, preferably 30–50%, smaller than the normal flow cross section of the burner. Normally, oxygen pres-

sure necessary for the working should be between 8 and 12 atü.

EXAMPLE 1

Burner comprising a ¼" tube packed with a core of one steel rod of O.D. 3.6 mm. and seven wires of O.D. 2.5 mm. placed around the steel rod. The burner has a normal flow cross section of 21 mm.^{2} and a flow cross section of 12 mm.^{2} at the place of the constriction of 0.35 mm. depth. This means a reduction of the flow cross section of about 41%.

EXAMPLE 2

Diameter of the tube ⅜", core: four wires of O.D. 2.7 mm. and ten wires of O.D. 2.7 mm., depth of groove 0.5 mm. Reduction of the flow cross section from 56.0 mm.^{2} to 36.5 mm.^{2}, i.e. about 35%.

The reduction of the flow cross section results in an increased jet action of the oxygen. The advantages of the described burner in comparison with known constructions are a smaller consumption of oxygen, material consumption of the burner is less and a shorter burning time is required. Therefore, the work is carried out more economically in all respects.

What we claim is:

1. A method of making a burner for burning holes in materials of hard structure such as concrete, rock, cast iron and the like comprising the steps of inserting a plurality of weldable wires longitudinally within a cylindrical metal tube and then compressing a portion of said tube for constricting the inside diameter of said tube for causing groove means to be formed on said tube and for simultaneously clampingly holding said wires in said tube.

2. A method of making a burner according to claim 1, wherein said tube is constricted by application of a swaging roller.

3. A method of making a burner according to claim 1, wherein said tube is constricted by heating a ring, placing the ring about said tube, and allowing said ring to cool and shrink about said tube.

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