- a mobile element placed in the axial seat of the nozzle body, having a front skirt-shaped portion and having a second output orifice, said mobile element being movable in translation in the axial seat towards the first output orifice under the effect of a gas pressure exerted on the mobile element until the front skirt-shaped portion of the mobile element protrudes outside the axial seat through the first output orifice, and

- an elastic element placed in the axial seat between the nozzle body and the mobile element exerting an elastic return force on the mobile element in a direction tending to move the mobile element away from a part to be cut,

characterized in that the front portion has an end portion in which the external diameter decreases progressively in the direction of the second output orifice.

As applicable, the nozzle according to embodiments of the invention may have one or more of the following technical features:

- the front portion also has a cylindrical portion of substantially constant external diameter.

- the end portion has at least one bevel forming an angle (α) with the front face of the nozzle body.

- the angle of the bevel is between 0.1° and 80°, and preferably between 10° and 45°.

- the external profile of the end portion is truncated-cone-shaped.

- the external profile of the end portion has at least one curved portion.

- the external profile of the end portion has at least one convex portion.

- the at least one convex portion has a radius of curvature of between 0.1 mm and 2 mm.

- the cylindrical portion has an external diameter of between 3 mm and 8 mm.

- the end portion has an external diameter of between 2.5 mm and 7 mm at the second output orifice.

- when the mobile element moves in translation in the axial seat towards the first output orifice located at the front face of the nozzle body, the front skirt-shaped portion of the mobile element protrudes outside the axial seat through the first output orifice of the front face of the nozzle body.

- the bottom of the axial seat of the nozzle body has a shoulder, and the peripheral wall of the mobile element has a stop, the elastic element being positioned between the shoulder and the stop.

- at least one sealing element is placed between the nozzle body and the mobile element, for example one or more O-rings.

- said at least one sealing element is placed in a peripheral slot made in the external peripheral wall of the mobile element.

More specifically, as shown in figure 2, the nozzle body 1, which is made of a conductive material, for example copper or brass, is designed to be attached to the laser focusing head 20 of the laser facility.

Advantageously, the nozzle body 1 is an axisymmetric part crossed end to end by an axial seat 5 along the axis AA, which extends from the rear face 1b of the body 1 to the front face 1a of said body 1.

The axial seat 5 opens out at the front face 1a and the rear face 1b of the nozzle body 1. The rear face 1b therefore has a first input orifice 11', while the front face 1a has a first output orifice 11 from the nozzle body 1, the first input and output orifices 11', 11 being coaxial to the axis AA.

This axial seat 5 is in fact a recess, for example a cylindrical recess with an internal shoulder 9 projecting radially towards the center of the seat 5, said internal shoulder 9 being formed by a restriction 15 of the area of the axial seat 5 level with the first output orifice 11 located on the front face 1a of the nozzle body 1.

The nozzle in document FR 1154224 also includes a mobile element 2 that is inserted into the seat 5 of the nozzle body 1, preferably coaxially with the body 1, as shown in figure 3. This mobile element 2 is able and designed to move in translation along the axis AA inside the seat 5 of the nozzle body 1.

According to document FR 1154224, this mobile element 2 includes a front portion 2a forming a cylindrical (i.e. tubular) skirt 6 arranged in the axial seat 5 of the nozzle body 1 and including an axial passage 4 with a second output orifice 12 opening out from the front portion 2 forming said skirt 6.

While the nozzle is in use, the laser beam 22 and the assist gas 23 pass through the axial passage 4 of the mobile element 2 and come out through the second output orifice 12 opening out from the front portion 2a forming said skirt 6.

The mobile element 2 can be moved axially in relation to the body 1 of the nozzle along the axis AA. Indeed, the mobile element 2 moves under the effect of the pressure of the assist gas 23 that is exerted on said mobile element 2, which tends to push it towards the part to be cut 30.

The translational movement of the mobile element 2 along the axis AA causes the skirt 6 to move towards the upper surface 30 of the sheet to be cut, before they come into contact with one another, as shown in ~~figure 4A~~figure 6A.

Thus, the gas is channeled by the skirt 6 and is concentrated on the laser spot and therefore the groove, which significantly improves the efficiency thereof and the metal is more effectively expelled.

Claims

1. A laser nozzle including:

- a nozzle body having an axial seat and a first output orifice located at the front face of the nozzle body,

- a mobile element placed in the axial seat of the nozzle body, having a front skirt-shaped portion and having a second output orifice, said mobile element being movable in translation in the axial seat towards the first output orifice under the effect of a gas pressure exerted on the mobile element until the front skirt-shaped portion of the mobile element protrudes outside the axial seat through the first output orifice, and

- an elastic element placed in the axial seat between the nozzle body and the mobile element exerting an elastic return force on the mobile element in a direction tending to move the mobile element away from a part to be cut,

wherein the front portion has an end portion in which the external diameter decreases progressively in the direction of the second output orifice.

2. The nozzle as claimed in the preceding claim, wherein the front portion also has a cylindrical portion of substantially constant external diameter.

3. The nozzle as claimed in one of claims 1 or 2, wherein the end portion has at least one bevel forming an angle with the front face of the nozzle body.

4. The nozzle as claimed in one of the preceding claims, wherein the angle of the bevel is between 0.1° and 80°, and preferably between 10° and 45°.

5. The nozzle as claimed in one of the preceding claims, wherein the external profile of the end portion is truncated-cone-shaped.

6. The nozzle as claimed in one of the preceding claims, wherein the external profile of the end portion has at least one curved portion.

7. The nozzle as claimed in one of the preceding claims, wherein the external profile of the end portion has at least one convex portion.