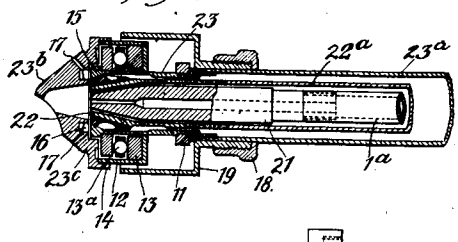
Aug. 20, 1929. N. MEURER 1,725,012

NOZZLE FOR ATOMIZING WIRE SHAPED MATERIALS

Filed Dec. 22, 1923

Fig. 1.



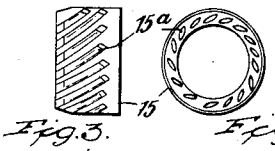
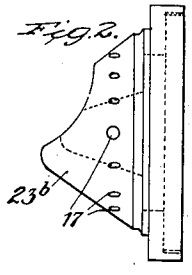


Fig. 3. Fig. 4.

Fig. 2.



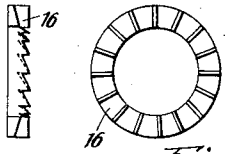


Fig. 5. Fig. 6.

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UNITED STATES PATENT OFFICE.

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NOZZLE FOR ATOMIZING WIRE-SHAPED MATERIALS.

Application filed December 22, 1923, Serial No. 682,347, and in Germany March 23, 1923.

Methods and apparatus have heretofore been proposed (see, for instance, British Patent No. 25,132 of 1913) for liquefying wire-shaped materials, more particularly metal wires, and to atomize them when in this state and spray them on to an article placed in front of the atomizing nozzle by surrounding the inner nozzle for guiding the wire coaxially with two other nozzles, a mixture of combustible gas and oxygen or compressed air being introduced into the space between the wire-guiding nozzle and the middle nozzle, while compressed air or some other atomizing gas is introduced into the space between the middle nozzle and the outer nozzle, which gas on emerging atomizes the wire fused by the ignited gas.

In these known apparatus, (compare, for instance, U. S. Patent No. 1,100,602) the stream of combustible gas, which feeds the flame and discharges between inner and intermediate nozzles, as well as the atomizing gas stream, which discharges between intermediate and outer nozzles, and also the material to be sprayed which is broken up into particles by the atomizing gas stream and melted by the flame of combustible gas, discharge from the nozzle system in line with the axis of the nozzles, in a form of a cone with its apex at the outer nozzle. Consequently the inner walls of articles having only narrow apertures, for instance pipes, into which the nozzle system, but not the entire spraying apparatus, can penetrate, can be reached by the spray system with difficulty or not at all, and hence these inner walls cannot be successfully coated by the spray particles which are projected in the axial direction of the nozzles.

The object of the present invention is to remedy the above difficulty, and this is effected by imparting to the flame of combustible gas, and to the spray particles carried forward by the main stream of the atomizing gas, a direction which is deflected with respect to the axis of the nozzles, by bringing branch streams of atomizing gas, which are taken aside during the streaming out of the atomizing gas through the nozzle system and which are then allowed to act on the main stream of atomizing gas and also on the mixture of combustible gas which feeds the flames, at an angle to the direction at which the main stream emerges at the mouth of the nozzle.

In Figs. 1 to 6 of the accompanying drawings one constructional example is shown of a nozzle for carrying out the above method, in which

Fig. 1 is a sectional elevation of a form of construction in which a portion of the nozzle is rotatable, and

Figs. 2 to 6 are details of construction of the apparatus illustrated in Fig. 1.

The nozzle system shown comprises an inner nozzle 21, a middle nozzle 22 surrounding the inner nozzle 21 and consisting preferably of two parts screwed into one another and an outer nozzle 23 surrounding the middle nozzle 22 and also consisting preferably of two parts screwed into one another.

A mixture consisting of combustible gas and oxygen under pressure or compressed air is conveyed to the annular space between the nozzles 21 and 22, while compressed air or some other atomizing gas is conveyed to the annular space between the nozzles 22 and 23.

If an oblique mouthpiece on the outer nozzle 23 be made rotatable with respect to the nozzles 21 and 23, a so-called centrifugal action nozzle is obtained, that is, an arrangement in which the particles of the material to be sprayed, besides being projected forwards, are also whirled round in a circle. In this way hollow objects, such as tubes of small diameter, into which a nozzle of this kind is inserted, may be sprayed internally, for instance coated with metal, by the nozzle being simply advanced in a straight line.

In this centrifugal-action nozzle the inner nozzle 21 is attached to a long tubular part 21^a and the nozzle 22 to a long tubular part 22^a to suit the length of the articles to be coated, which long tubular parts are attached to a nozzle head (not shown in the present case). The outer nozzle consists of the tubular part 23^a also attached to the nozzle head, a supporting sleeve 23 fixed by means of the annular nut 11 to the end of the part 23^a and the mouth piece proper 23^b of the outer nozzle, which is cut off obliquely at the front.

This mouth piece 23^b of the outer nozzle is mounted on a sleeve-shaped supporting member 12, which is provided on one side with ball bearing races 13, 13^a. The race 13^a is fixed on the sleeve 23, which is provided at the front with an abutment 23^c, and is thus integral with the sleeve 23, while the ball race 13 lies against the supporting ring 12,

to which the mouth piece 23 of the outer nozzle is rigidly connected. Thus the parts 23^b, 12, 13 rotate with the balls 14, around the parts 23, 23^c, 13^a.

This rotation is caused to take place automatically by a portion of the atomizing air, which flows between the tubular parts 22^a, 23^a, having to pass a ring 15 of guide blades 15^a. This ring of guide blades is shown in Figs. 3 and 4 in side elevation and front elevation and consists of an annular sleeve, in the periphery of which there are inclined or helical slits 15^a. The compressed air, which in passing through the slits 15^a has a twist imparted to it, after passing through the guide wheel impinges against the blades of a ring of rotor blades 16 mounted in an annular bore in the mouth piece 23 of the outer nozzle, so that the air, which escapes from holes 17 provided in the nozzle part 23^b, in impinging against the blades of the rotor, exerts a turning moment on the rotor and thereby on the nozzle part 23^b, in consequence of which the part 23^b, together with the supporting sleeve 12, turns about the stationary nozzle parts. The main stream of atomizing air passes unhindered out of the grooves let into the nozzle part 22 into the central bore of the mouthpiece 23^b of the outer nozzle part and there atomizes the material to be sprayed, as it is fused.

In order to prevent the rotating part 23^b—12 striking against the inside of the walls of narrow articles as the nozzle system is being advanced, and the rotary motion of the said rotating part being thereby checked, a protecting sleeve 19 may be provided on it, which is slidable on the tubular part 23^a and may be fixed thereon by a nut 18 and which surrounds the rotating part 12—23^b, thus preventing it scraping against the walls of the article to be coated.

What I claim is:—

A nozzle system for atomizing wire-shaped material, which has been fused from the solid to a fluid state, by means of a gaseous medium under pressure, comprising in combination an inner, an intermediate and an outer nozzle, a rotatable mouthpiece on the said outer nozzle, the open end of the said mouthpiece being oblique with respect to the axis of the nozzle, a ball bearing between the rotatable mouthpiece and the outer nozzle, a turbine rotor on the rotatable mouthpiece and a set of guide blades between the outer and intermediate nozzles for conveying a portion of the atomizing medium to the said rotor, as set forth.

In testimony whereof I have signed my name to this specification.

NICOLAUS MEURER.