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N. MEURER

APPARATUS FOR ATOMIZING ELONGATED BODIES SUCH AS WIRES AND BANDS

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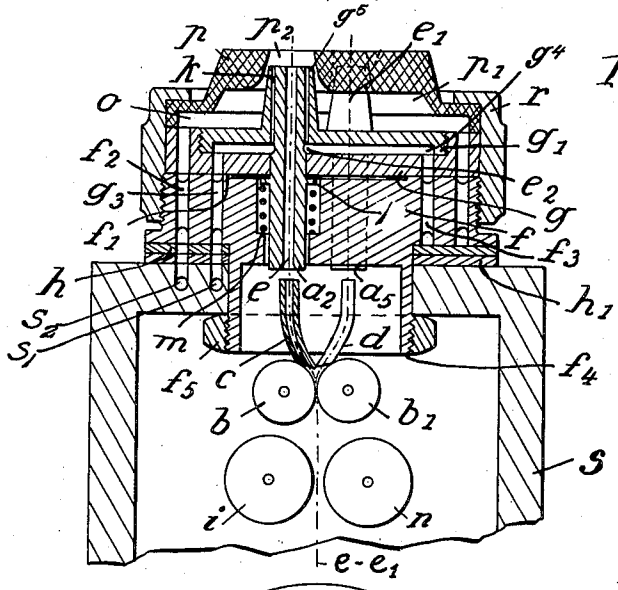


Fig. 1.

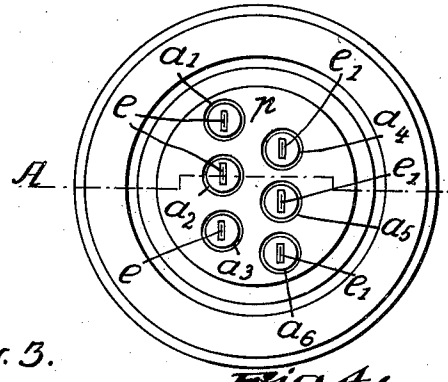


Fig. 2.

Fig. 3.

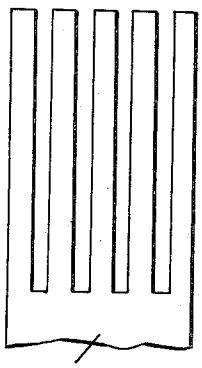


Fig. 4.

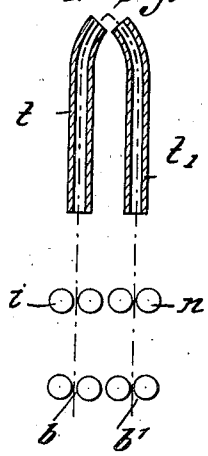
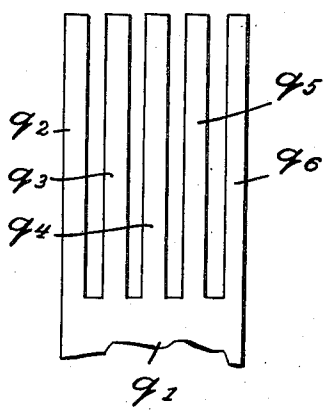


Fig. 3a.



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APPARATUS FOR ATOMIZING ELONGATED BODIES SUCH AS WIRES AND BANDS.

Application filed June 4, 1923. Serial No. 643,467.

To all whom it may concern:

Be it known that I, NICOLAUS MEURER, a German subject, residing at No. 4 Kaiser Korso, Berlin-Tempelhof, Germany, have invented certain new and useful Improved Apparatus for Atomizing Elongated Bodies Such as Wires and Bands, of which the following is a specification.

It has already been proposed to atomize elongated bodies, more particularly metal wires, metal bands and the like and to spray them on to articles placed in front of the spraying nozzle and to form coherent coatings on these articles, by conveying the material to be sprayed to a spraying apparatus, in the nozzle of which the material to be sprayed is continuously melted by any source of heat and is thereupon exposed to a jet of compressed air, which atomizes the molten material and throws it with great force from the nozzle aperture of the atomizer.

For practical reasons it is necessary to keep down the dimensions of the material to be sprayed and which is fed to the spraying apparatus, thus making the diameter of the metal wires, when these are used, at most 1–2 mm., or when bands are used, making the width at most 5 mm. and the thickness one-tenth to two-tenths of a millimeter. For, if the dimensions are made any greater, the source of power for feeding the material to be sprayed will not be great enough to advance it uniformly with the necessary certainty. An increase in the dimensions and consequently in the power of the driving motor to be mounted in the spraying apparatus, which is practically always operated by compressed air should not be too heavy, would make the dimensions and weight of the spraying apparatus so great that it would be made more difficult to manipulate. In addition to this an increase in the maximum dimensions of the wires or bands given above would reduce their flexibility and also render the manipulation of the spraying apparatus more difficult.

In order to increase the output of the well-known spraying apparatus without any appreciable increase in the weight, according to the present invention a plurality of wires or bands to be sprayed is fed to a common spraying apparatus, but at points separated from each other, and is thereupon melted and atomized at points separated from each other. The separate atomizing jets are preferably staggered with respect to each other and are so arranged that the jets impinging on the article placed in front of the spraying apparatus will emerge, so that a continuous line will be formed on the article placed in front of the jet. The gas under pressure for atomizing the metal and the combustible mixture for maintaining the fusing flame are preferably conveyed to the common spraying apparatus each in an undivided stream through a separate tube.

Two constructional examples of such a system of nozzles based on the present invention and suitable for carrying out the method described are shown in the accompanying drawing, in which—

Figure 1 is a longitudinal section through and Figure 2 a front elevation of a system of nozzles having six atomizing nozzles.

Figures 3, 3^a show diagrammatically the material to be sprayed in the form in which it can be used in a system of nozzles according to the present invention.

Fig. 4 is a detail of a modified form using electrical means for fusing.

As regards the arrangement shown in Figures 1 and 2, in which Figure 1 is a section on line A—B of Figure 2, the arrangement is as follows:

The system of nozzles consists of a main nozzle support f, which is movably fixed to the casing of the spraying apparatus S by means of a threaded part f^4 and a nut f^5 screwed on to the said part. The nozzle support f contains a number of bores, in the present case six, in which are inserted the nozzle parts a^1, a^2, a^3, a^4, a^5, a^6 for guiding the separate pieces of material to be sprayed and having suitable ducts e—e^1, which are adapted to the shape of the material to be sprayed. The nozzle parts a^1—a^6 are provided with a shoulder or flange 1, in the middle, the part below the flange being turned to form a cylindrical tube. These tubular parts are inserted in holes in the nozzle support f and are acted on by helical springs m, which are laid round them, so that the said springs m, which rest on an

abutment at the bottom, exert a pressure on the flanges and seek to push the nozzle parts a^1—a^6 upwards. That half of the nozzle parts a^1—a^6 lying above the flanges, is slightly conical on the outside and is also provided on the outside with a turned-in groove e^2. The nozzles in addition to including the main nozzle parts also include an inner auxiliary supporting part g common for all of the main nozzle parts and an intermediate part g^1 is detachably engaged in spaced relation with the inner part g as by screw threads. This part g^1 is formed with a plurality of open conical portions g^5 which surround in spaced relation the outer portions of the main nozzle parts a^1—a^6. An intermediate space g^4 is left between the intermediate-part g^1 and the inner auxiliary supporting part g and this intermediate space acts as a distributing space for the gas mixture, which is fed to the nozzle system and which rising from the duct g^3 in the nozzle support f is fed to the said nozzle system in a known manner by means of tubes connected to the casing of the spraying apparatus S, the arrangement being such that passages S^1 provided in the wall of the spraying apparatus S, which passages are capable of accurately regulating the amount of gas mixture by packing plates h—h^1 provided between the casing of the spraying apparatus S and the nozzle support f, provide communication between the nozzle system of the spraying apparatus and the gas mixture. The gas mixture in the space g^4 flows into the annular groove e^2 of each nozzle part a^1—a^6 and rising from the said grooves into the annular gap k between the upper part of each of the nozzle parts a^1—a^6 and the upwardly projecting parts of the nozzle part g^5 surround the same. Emerging from the end of the annular gap between the nozzle parts a^1—a^6, and g^5, the gas mixture is ignited and fuses the wires or the like e—e^1, which are fed into the ducts of the nozzle parts a^1—a^6, according to the rate at which they are advanced.

The fused material is atomized by a jet of compressed air or the like, which is conveyed to the spraying apparatus in a known manner. In the front of the wall of the casing of the spraying apparatus S holes S^2 are provided for the compressed air, similar to those for the combustion gas mixture, which convey the compressed air, after it has passed through the adjustable ducts in the packing plates h—h^1, to the duct f^2 in the nozzle support f. From the duct f^2 the compressed air passes through corresponding ducts in the inner part g into the space o remaining between the nozzle part g^1 and the outer nozzle part p above the same. The outer nozzle part p forms a tight joint with the inner nozzle part g and these two parts are held in such position by means of a screw cap r which embraces the outer part and is detachably arranged in threaded engagement with the external threads of the main support f. The outer nozzle is provided with conical holes p^2 corresponding to the shape of the raised parts g^5. Between the walls of the holes p^2 and the raised parts g^5 there is an annular gap, from which the compressed air accumulating in the space o flows, carrying the liquefied material through the fusing flame and atomizing the same. As is shown in Figures 1 and 2, the nozzles a^1—a^6 are staggered relatively to one another. This has the advantage that relatively many nozzle apertures can be distributed over the outer surface of the nozzle orifice p, while keeping this surface as small as possible.

As regards the invention it is immaterial in what form the material to be sprayed is conveyed to the nozzles a^1—a^6, whether in the form of a wire or a band. In the constructional examples shown in Figures 1 and 2, it is assumed that the material to be sprayed is band-shaped. The separate bands e—e^1 are fed to the suitably shaped guide members having passages c—d by means of feed rollers b—b^1 and emerging from the rollers are passed alternately to the left hand guiding passage c or to the right hand guiding passage d. The principle is of course the same if wires are used instead of bands.

When bands are used a broad band may be fed to the spraying apparatus, which is only cut into separate strips in the spraying apparatus itself, in which case the broad band would first pass through a pair of cutting rollers i—n in the direction of the nozzle system, whereupon the divided band would pass through a pair of feed rollers b—b^1, which would feed it in its divided state in the manner already described alternately to the left and to the right into the passages c—d and from there into the separate nozzles.

The same result may be obtained by making incisions in the broad band before it enters the spraying apparatus, which incisions only extend to a certain length and are then interrupted, so that at these points the band remains undivided. This would have the object of causing the cutting apparatus only to cut through the quite short distances, so that it will not be subject to so much wear and will require relatively little power.

According to another modification—and this would apply more particularly where the fusing is effected by means of the electric arc—the bands may be subdivided in such a manner by the cutting mechanism in the spraying apparatus that, as is shown in Figures 3 and 3^a, the band is cut into strips with spaces between them so that of the original band q—q^1 only the strips q^2—q^6

remain, in which case the band may be cut by cutting tools partly inside the spraying apparatus and partly outside it. In this case, where electric fusing is employed, the fork-shaped strips q—q^1 are first passed forward, as shown in Figure 4, through the pair of feed rollers b—b^1 and are thereupon divided by the pair of cutting rollers i—n, so that the continuous separate strips q^2—q^6 are fed to the pole pieces t—t^1. At the end of the pole pieces the two strips q^2—q^6 come together at an angle and close the circuit by making contact with each other, by which means fusing takes place in a known manner through the arc, which is formed or through the heat due to resistance (compare French Patent No. 461028).

What I claim is:—

1. A spraying apparatus for spraying fusible materials admitted thereto in the form of elongated bodies, comprising a casing, a plurality of nozzles arranged adjacent to one another within the casing, a support common for all of said nozzles, each nozzle including a main nozzle part and a plurality of other parts coacting with all of the main nozzle parts and spaced from each other and from the main nozzle parts to provide chambers and gaps therebetween, the nozzle parts, support and casing also having passages and ducts provided therein, and the said chambers, gaps, passages and ducts constituting means for conducting gases and compressed air to each of the main nozzle parts so as to fuse the elongated bodies separately as they emerge from the nozzles and to also separately atomize the separately fused elongated bodies, substantially as and for the purposes set forth.

2. A spraying apparatus for spraying fusible materials admitted thereto in the form of elongated bodies, comprising a casing, a plurality of nozzles arranged adjacent to one another within the casing, a support in the casing common for all of said nozzles, each nozzle including a main nozzle part having a longitudinal duct for the passage of said elongated bodies, and a plurality of suitably spaced parts coacting with each of the main nozzle parts, one of said parts having a number of open conical portions corresponding to the number of main nozzle parts, the space between the inner part and the part having the conical portions constituting a chamber common to all of the main nozzle portions for the passage of gaseous mixture through said conical portions to ensure of the separate fusing of the elongated bodies as they emerge from the ducts in the main nozzle parts.

3. A spraying apparatus as claimed in claim 2, wherein the space between the outer nozzle part and the part having the conical portions constitutes a chamber for the reception of compressed air, the said outer portion being also provided with conical holes coacting with each of the conical portions on the medial part so as to leave air gaps for the passage of the compressed air therethrough to ensure of the separate atomizing of the separately fused elongated bodies.

4. A spraying apparatus for spraying fusible materials admitted thereto in the form of elongated bodies, comprising a casing, a plurality of nozzles arranged adjacent to one another within the casing and each having longitudinal ducts for the passage of said elongated bodies. a support common for all of said nozzles, a cutting device and a feeding device within the casing, a plurality of guiding members having passages arranged opposite the entrance of the longitudinal ducts of the nozzles, said cutting device being capable of cutting a broad band into a number of strips corresponding to the number of nozzles, and said feeding device being capable of feeding the said strips from the guiding members into the ducts of the nozzles.

5. A spraying apparatus as claimed in claim 4, wherein the guiding members are bent alternately to either side with respect to the direction of feed of the feeding device, substantially as and for the purposes set forth.

6. An apparatus for spraying fusible material comprising a casing, a nozzle support therein provided with a plurality of openings, a plurality of nozzles mounted in the support and each including a plurality of main nozzle parts and an inner auxiliary supporting part common to all of the main nozzle parts each main nozzle part having a duct passing entirely therethrough for the passage of the material to be sprayed, a second nozzle part coacting with the main nozzle parts and provided with a plurality of open conical portions for surrounding in spaced relation the corresponding main parts so as to leave gaps therebetween, the second nozzle part being detachably engaged in spaced relation with the inner auxiliary supporting part to leave a chamber for allowing the combustion gas mixture to pass therethrough and through the gaps for fusing the material to be sprayed when ignited, and springs acting on the inner portions of the main nozzle parts and positioned within the support for yieldingly holding the main nozzle parts in position.

7. An apparatus for spraying elongated fusible material as claimed in claim 6, wherein the nozzles also include a common outer part surrounding the inner auxiliary supporting part and the second nozzle part and resting on the auxiliary supporting part and forming a tight joint with said latter part, said outer nozzle part being also provided with a plurality of conical holes for coacting with the corresponding main nozzle

parts and the conical portions on the second nozzle part for allowing the passage of compressed air to ensure of a separate atomizing of the separately fused material as it emerges from the ducts in the main nozzle parts, and a screw cap engaging with the outer common nozzle part and the main common support in such manner as to form a tight joint between the inner auxiliary supporting nozzle part and the support.

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

NICOLAUS MEURER.