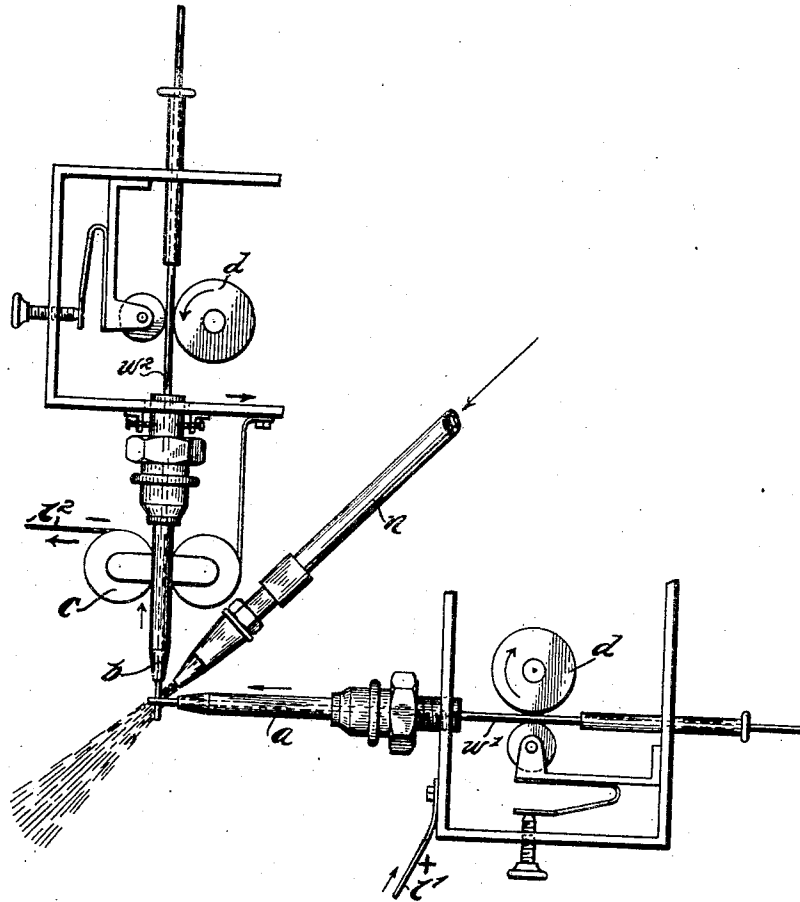


M. U. SCHOOP.  
METHOD OF SPRAYING FUSIBLE SUBSTANCES.  
APPLICATION FILED JULY 6, 1914.

1,133,508.

Patented Mar. 30, 1915.



Witnesses  
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# UNITED STATES PATENT OFFICE.

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## METHOD OF SPRAYING FUSIBLE SUBSTANCES.

1,133,508.

Specification of Letters Patent.

Patented Mar. 30, 1915.

Original application filed February 19, 1914, Serial No. 819,722. Divided and this application filed July 6,  
1914. Serial No. 849,332.

*To all whom it may concern:*

Be it known that I, MAX ULRICH SCHOOP, a citizen of the Swiss Republic, residing at Zurich, Switzerland, have invented certain new and useful Improvements in the Method of Spraying Fusible Substances, of which the following is a specification.

This invention relates to the spraying of metals or other fusible substances on to a base for the purpose of forming either adhering or separable coatings which are impacted thereon as described in my former patent application Serial No. 52800 filed April 1st 1910, patented February 9, 1915, No. 1,128,058, and the present application has for its object to provide a simple method of melting and simultaneously spraying the metal or fusible substance.

This invention consists in introducing the fusible substance or metal into a zone where it is immediately melted or fused by an electric current conducted to the zone by the unmelted portion of the said fusible substance and spraying and impacting the fused portion immediately it has been fused.

Suitable means for carrying out this process are described and illustrated in my co-pending application Serial No. 819,722 filed February 19th, 1914, from which the present case has been divided.

Referring to the accompanying drawing which is a somewhat diagrammatic view in plan of a suitable apparatus, in the drawing *a* and *b* designate two feed tubes, which terminate in nozzles and are preferably made of iron, the tube *b* forming the armature of an electromagnet *c*. Through these tubes two wires *w*<sup>1</sup>, *w*<sup>2</sup>, are fed by means of feed rolls *z* so that the ends of the wires, issuing from the nozzles, cross each other as shown in the drawings. The two feed tubes and the wires issuing therefrom, form parts of an electric circuit, other parts of which are shown at *l*<sup>1</sup>, *l*<sup>2</sup> and current flows in this circuit, as indicated by arrows. The coils of the electromagnet also form part of the circuit. The tube *b* is elastically supported, so that it can vibrate, and the tubes are placed at an angle of about 90° to each other, with the wires making slight frictional contact where they cross, and with the nozzles spaced apart only a few millimeters. When

the electromagnet *c* is energized it attracts the tube *b* and by this means slightly withdraws the wire electrode *w*<sup>2</sup> from the wire electrode *w*<sup>1</sup>. A blast pipe *n* has its nozzle directed toward the place where the wire electrodes cross, in order to direct a stream of air or other gas on the electrodes. The blast apparatus may be used for driving a turbine whereby the wire feed mechanism is actuated.

The action of the apparatus is as follows:—Current flowing through the circuit, while the electrodes are in contact, energizes the electromagnet *c* whereby the electrodes are drawn apart, and a small arc is formed, accompanied by melting of some of the metal. This molten metal is at once driven away in the form of a fine spray, by the stream of gas from the pipe *n*, which also blows out the arc *in statu nascendi*, so that the magnet allows the electrodes to approach each other again. The magnet is then again energized, and another arc is formed, and so on, the action being repeated with great rapidity, so that a continuous stream of spray is driven from the electrodes and projected on to the surface to be coated.

The potential difference at the electrodes varies, of course, according to the conductivity of the metal or other substance, and the thickness of the filament. Values ranging from 40 to 75 volts are generally suitable. The rate of consumption of the positive electrode is somewhat higher than that of the negative electrode, so I may use a more rapid feed, or a thicker wire, for the positive electrode but in any case the rate of feed must be adjusted to the rate at which melting is taking place.

The vibratory arrangement which I have described may be applied to both the electrodes. Its advantage lies in the fact that it produces a more uniform and localized consumption of the electrodes. If the electrodes are merely fed toward each other without vibration, there is a tendency for the arc to flicker or to spread and roast the tubes, and in some cases the electrodes tend to become sweated to each other if a lower potential difference is used in order to avoid an excessive arc.

An angle of about 90° for the two elec-

trode tubes is found most advantageous for most purposes, but the angle may vary. The best angle for the blast nozzle is easily ascertained in each particular case, as is also the most advantageous distance of the blast nozzle from the electrodes; in some cases it is best to have the blast nozzle close to the electrodes, but in others a distance of 20 or 30 mm. from the arc is better.

10 In the case of some metals, especially those of low melting point, part of the metal may be vaporized by the current. The vapor forms a fine condensate, or is projected with the spray against the surface to be coated.

15 I claim:

1. In the method of production of the spray of fusible substances, the step which consists in passing an electric current through electrodes formed of said substance  
20 whereby said electrodes are melted, and subjecting the molten material to an atomizing blast of gas under pressure.

2. In the method of production of the spray of fusible substances, the step which  
25 consists in introducing a fusible substance into a zone where it is melted by an electric current conducted to said zone in part by

said substance, and subjecting the molten material to an atomizing blast of gas under pressure. 30

3. In the method of production of the spray of fusible substances, the step which consists in feeding a filament of the substance forward into a zone where it is melted by an electric current conducted to said zone in part by said filament, the feeding rate being substantially equal to the melting, and  
35 subjecting the molten material to an atomizing blast of gas under pressure.

4. In the method of production of the spray of fusible substances, the step which consists in passing an electric current through electrodes formed of a fusible substance, said electrodes being intermittently in contact thereby producing a fusing arc, and subjecting the molten material to an atomizing blast of gas under pressure. 40 45

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MAX ULRICH SCHOOP.

Witnesses:

CARLO GUBLER,  
FRANK BOHR.