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Improved Process of and Apparatus for Applying Coatings or Deposits of Fusible Substances to Surfaces—*JTST* Historical Patent #23*

UNITED KINGDOM PATENT
E. Morf, Zurich, Switzerland

No. 25, 132 A.D.[1] 1913[2]

I, Erika Morf, of 82, Hardturmstrasse, Zurich, Switzerland, Spinster, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:

This invention relates to a process of and apparatus for applying coatings or deposits of fusible substances to surfaces. In particular, the invention relates to the forming or producing on various surfaces of deposit or coatings of various materials such for instance as, metal, glass, or other fusible substances by means of a process such as described in Specification No. 28,001 of 1912, which consists in subjecting a rod or wire of such substance to the action of a blow-pipe flame or like melting means, melting off small portions of said substances therefrom, atomising or spraying such small melted portions, and flinging or projecting them against the face that is to be treated.

According to the present invention, the bar or wire of solid fusible substance is fed towards the melting point by an automatic or mechanical feeder or conveying device in such a manner that the feed or forward travel, the melting, the atomizing or spraying, and the flinging-on or projection of the aforesaid fusible substance are all effected automatically or mechanically at the same proportional rate or bear a direct relation to each other.

A convenient mode of achieving this is to effect the feed by the same means whereby the atomising or spraying is effected. For this purpose there may be employed a current of air in the path in which is located a turbine or like motor adapted to be driven thereby to actuate or drive the feeding mechanism.

The invention will now be described more fully with reference to an example shown by way of illustration in the accompanying drawings, in which:

Fig. 1 is a sectional side elevation of a portable apparatus embodying the invention.

Fig. 2 is a longitudinal section of a detail thereof, showing the spraying nozzle and the supply conduits.

Fig. 3 is a section of the same taken approximately on the line **a–b** of Fig. 2.

In the said drawings, **a** indicates the wire that is fed forward and melted, **b**, **c** are the feeding wheels or rollers, and **d** is the nozzle.

The wire **a** is introduced between the feeding wheel or rollers **b**, **c** into the nozzle **d**, which is provided with a concentrically arranged gas-supply passage. The gases (for instance, benzine-vapor or hydrogen and oxygen) are led in through conduits **c** in the nozzle and compressed air through **f.** The valve **g** serves for the simultaneous control of both the compressed air and the gases, the valve being provided, however, with a byepass which in the closed position still allows a small amount of hydrogen to pass so that a small pilot flame remains in the nozzle. In this way the apparatus can be started only by opening or closing the valve **g.** After passing through the valve, the compressed air flows through the small turbine or like motor **h–i** and thence by way of a tube **k** to the outermost passage of the nozzle **d. l** and **m** are two worm gears which transmit the rotary motion of the turbine, but suitably reduced, to the driven feed roller **b; s** is an abutment screw or the like positioning and holding device for fixing the position of the idle feed roller or pressure roller **c; r** is a regulation device for the gas; another regulation device not shown in the drawings may be provided for the blast.

The relation between the proportion of hydrogen and oxygen used may be very variable, i.e, from 1 to 1, to 1 to 15, according to the material to be worked with and the construction of the nozzle. Generally the experiences obtained in autogenous welding may be directly transferred in many cases to the present invention. In this connection, it may be mentioned that the outflowing velocity of the oxy-hydrogen mixture must be greater than the so-called striking back velocity if the flame is not to strike back.

It will be obvious that in some cases only one gas burning in air is sufficient for melting, as, for instance in the case of lead, where hydrogen alone is sufficient; but in the case of metals hav-

[1] (Under International Convention) Date claimed for Patent under Patents and Designs Act, 1907, being date of first Foreign Application (in Germany), 5th Nov. 1912. Date of Application (in the United Kingdom), 4th Nov. 1913. At the expiration of 12 months from the date of the first Foreign Application, the provision of Section 91 (3) (a) of the Patents and Designs Act, 1907, as to inspection of Specification, became operative. Accepted, 4th Nov. 1914.

[2] Extension of Patent. Patent No. 25,132, AD. 1913. A New Patent has been granted for a term of 4½ years from the expiration of the original Patent (4th Nov. 1928), by Order of the High Court. The Patent Office, 2nd March 1929.

*This series of historical patents concerned with thermal spray technology has been compiled by C.C. Berndt (SUNY at Stony Brook, NY) and K.A. Kowalsky (Flame-Spray Industries, Inc., NY).

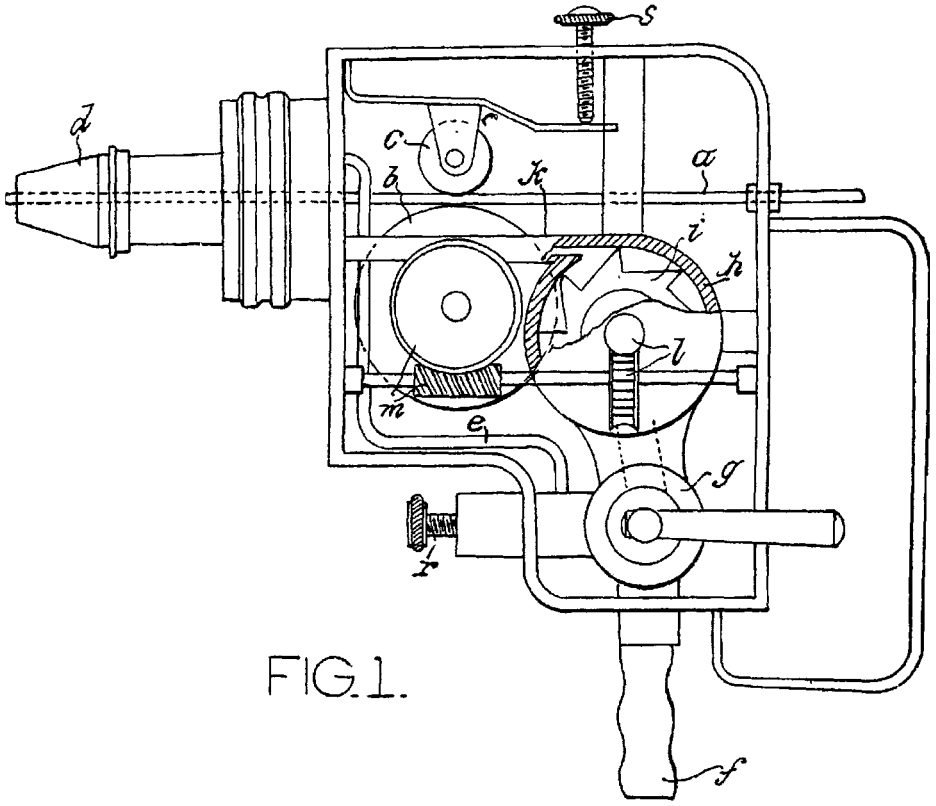


FIG. 1.

FIG. 2

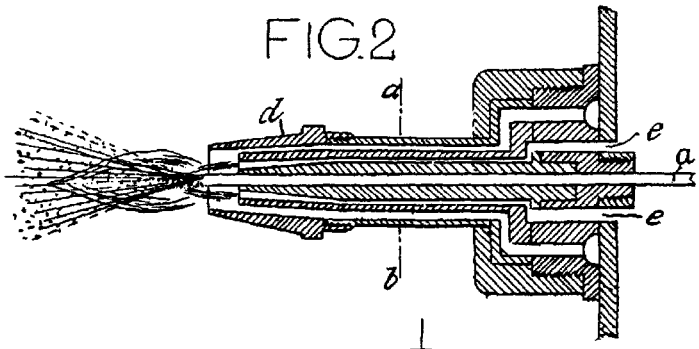
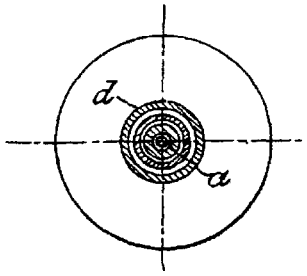


FIG. 3



ing a considerably higher melting point an oxy-hydrogen or like flame would be required.

It will also be obvious that the material to be melted can be introduced into the apparatus or the nozzle in any suitable form other than a wire, as, for example, in the form of a cable, bar, leaf, strip, or the like; also that when in the form of, for instance, a tube or other hollow or recessed body it may be filled with a substance, which, when melting, is capable of any particular desired action, such for instance as ammonium chloride, which would evolve protecting vapors.

It is further obvious that for driving the feed roller an electric motor, clockwork, or other suitable extraneous driving device may be used in place of the turbine or the like device driven by the compressed air. In the case of using means other than a tur-

bine for driving the material to be atomized, the rate of working such means would be made proportional to the pressure of the blast in any well-known manner.

Furthermore, it is not absolutely necessary that the feed device and the melting, and the atomizing and spraying nozzle should be rigidly combined with each other, for in cases where for instance thick wires or great quantities of wire are to be dealt with the feed device must be built more strongly and, correspondingly becomes heavier and less portable so that a separation of the two parts of the apparatus, the feed mechanism and the nozzle, may be of advantage. The wire in such a case would be pushed by the feed mechanism for instance through a metal hose to the nozzle. To get over the difficulty of greater distances where the pushing-forward of the wire is not very practical, the nozzle and the feed rollers or the like may be carried by one part of the apparatus while the driving motor may be independently mounted and may be arranged to transmit its power by means of a flexible shaft to the feed rollers or the like conveying device. Generally speaking the disposition of the various parts or members at the time of use may be as required by the circumstances of the case, the essential feature, however, in all cases being that the material to be melted, the gases for effecting the melting, and the means for dusting, atomizing, or spraying in suitable quantities and under suitable conditions should automatically or mechanically co-operate at the tip of the nozzle or at some point in front of it in such a manner, that a regular melting-off and flinging-off will take place.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. A process of applying coatings or deposits to surfaces consisting in feeding the solid fusible substance of which the coating or deposit is to be formed toward the melting point by an automatic or mechanical feeder or conveying device in such a manner that the aforesaid feed, the melting, the atomising or spraying, and the flinging-on, or projection of the aforesaid fusible substance are all affected automatically or mechanically at a proportional rate or are arranged to bear a direct relation to each other.
2. Apparatus for applying coatings or deposits to surfaces comprising a feeding means for the solid fusible substance that is to be applied, a melting device, a means for atomising or spraying, and for flinging on or projecting the molten substance, all adapted to operate automatically or mechanically at a proportional rate or arranged to bear a direct relation to each other.
3. In or for an apparatus of the kind set forth in Claim 2, a mechanical feeding device adapted to be actuated or driven by the same means whereby the atomising or spraying is effected, substantially as and for the purpose herein-before set forth.
4. An apparatus as set forth in Claim 2 in which the melting and atomizing or spraying device and the feed mechanism or its motor are arranged on separate and distinct portions of the apparatus for the purpose hereinbefore set forth.

Dated this 4th day of November, 1913. Hubers and Mond, 19, Southampton Buildings, Chancery Lane, London, W.C.

ERIKA MORF