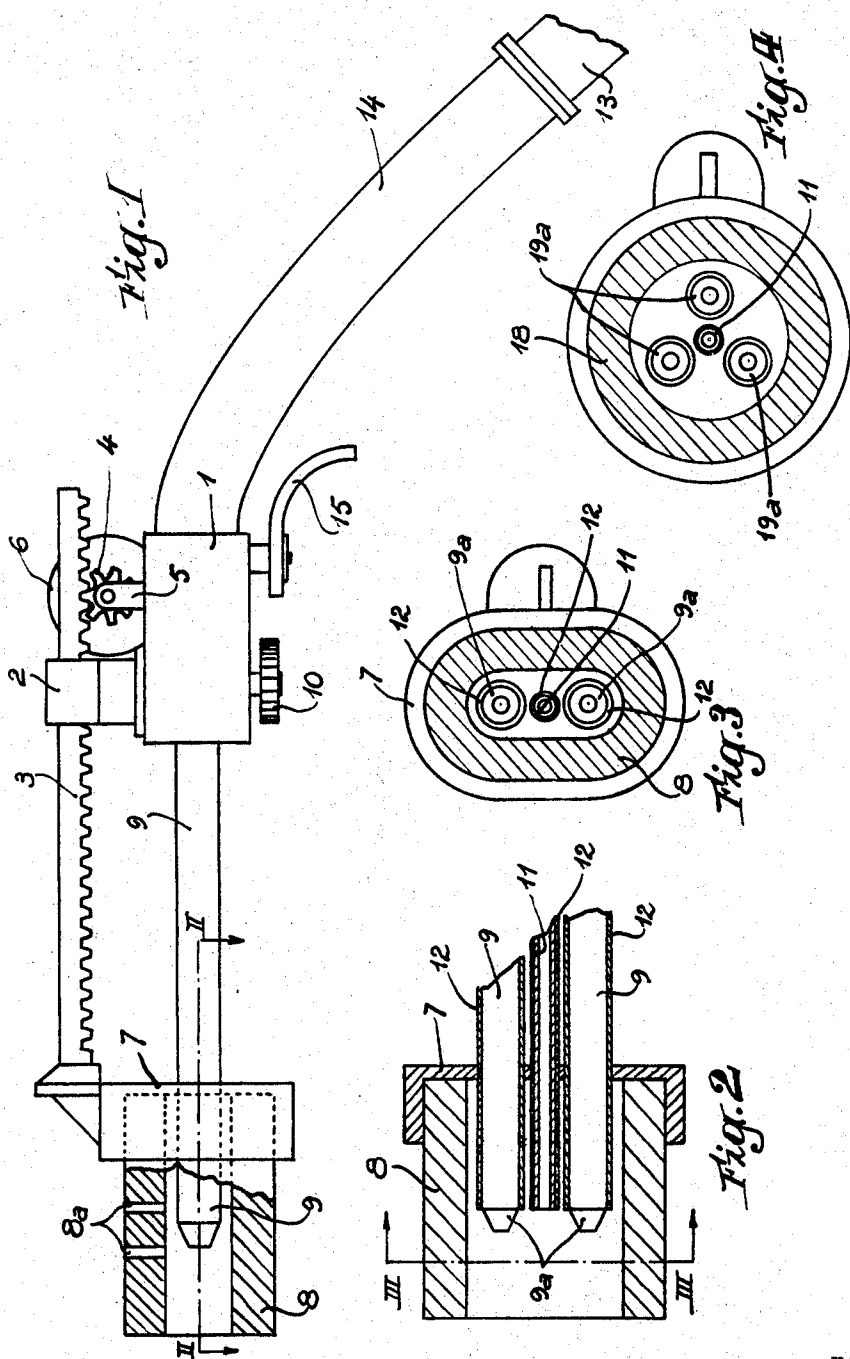


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 APPARATUS FOR THE PRODUCTION OF A COATING LAYER
 OF GLASS MATERIAL
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APPARATUS FOR THE PRODUCTION OF A COATING LAYER OF GLASS MATERIAL

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8 Claims. (Cl. 239—81)

ABSTRACT OF THE DISCLOSURE

The apparatus comprises a number of parallel electrodes which surround a heat-resistant insulating tube through which a jet of gas with glass particles in suspension is projected through the arc established between the ends of the electrodes. These ends are preferably surrounded by a refractory sleeve which may be displaced as the electrodes burn away and as the tube is destroyed by the arc. The arc may be maintained at the ends of the electrodes by providing same with an insulating layer.

Description

This invention relates to coating apparatus and methods and it more specifically concerns apparatus and methods for the production of a continuous protective and decorative layer of glass material on various surfaces such as metal, stone, concrete, ceramic, etc.

In accordance with the present invention such a layer is obtained by projecting against the surface to be coated a mist of fine liquid or semi-liquid particles produced by blowing glass powder through an electric arc.

The present invention further concerns a spraying gun adapted to produce a mist of glass particles in the liquid or semi-liquid state, this gun comprising a plurality of carbon electrodes and a metallic tube disposed between the said electrodes. An electric arc is struck between the ends of the carbon electrodes and a gas with suspended glass powder is blown through the tube which acts as a nozzle in the vicinity of the electric arc in such a manner that the gas jet with the glass particles in suspension therein passes through the electric arc where the particles are brought to the liquid or semi-liquid state before being projected against the surface to be coated. The tube and the carbon electrodes are preferably coated with an insulating layer in order to avoid the arc striking the metallic tube or wandering along the length of the electrodes. As the electrodes burn away, this insulating layer is progressively disintegrated as the metallic tube itself. The ends of the electrodes and of the tube are conveniently surrounded by a protective sleeve of refractory material and the spraying gun may comprise means to adjust the longitudinal position of this sleeve with respect to the electrodes.

In the annexed drawings:

FIG. 1 is a general side view of a spraying gun according to an embodiment of the present invention.

FIG. 2 is a fragmental longitudinal section thereof taken along line II—II of FIG. 1.

FIG. 3 is a cross-section taken along line III—III of FIG. 2.

FIG. 4 is a cross-section similar to FIG. 3, but corresponding to a modified arrangement comprising three electrodes for three-phase electric current.

Referring to FIG. 1, the spraying gun comprises a cylindrical body 1 having an upwardly directed lug 2 which slidably supports a longitudinal bar 3 the lower edge of which is formed with teeth. This bar or rack 3 cooperates with a pinion 4 rotatably supported by a

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small bracket 5 secured to the upper side of body 1. The shaft of pinion 4 is provided with an actuating knob 6 by means of which the bar or rack 3 may be displaced longitudinally in one or the other direction through lug 2 which acts as a guiding member. Additional guides may besides be provided, if required. Conventional frictional means, not illustrated, may be provided to maintain bar 3 at the position at which it has been set. For instance bar 3 may be so arranged as to slide with noticeable friction through lug 2.

The front end of bar 3 carries an annular metallic cap 7 of horizontally elongated cross-section, as shown in FIG. 3. Cap 7 supports the rear end of a sleeve 8 made of a highly heat-resistant material, as for instance carbon, refractory brick, etc. As indicated in FIG. 1, the upper portion of sleeve 8 has two longitudinally spaced vertical holes 8a.

Body 1 carries two spaced parallel carbon electrodes 9 which project forwardly therefrom in parallel relation to bar or rack 3 so as to pass through cap 7 and to enter sleeve 8. The rear ends of electrodes 9 are clamped within body 1 by means of a lower knob 10, the clamping mechanism itself (not illustrated) being of any known construction. Body 1 also carries a metallic tube 11 which is disposed between electrodes 9 in parallel relation thereto. Tube 11 and electrodes 9 are covered with a relatively thick layer 12 of asbestos board, of baryta paper or of any other heat resistant insulating material. The rear end of tube 11 communicates with an inlet line 13 through the hollow handle 14 of the gun. Line 13 is adapted to receive a gas, such as air, with glass particles in suspension therein. This may be obtained by any conventional means well-known in the art. For instance the glass powder may be contained in a reservoir having an upper outlet and a downwardly directed inlet nozzle connected with a compressed air line in such manner that the air jet issuing from the inlet nozzle may strike the powder and bring the particles thereof to a state of suspension so that they may be entrained through the outlet, the said line 13 being of course connected with the latter. There besides exists a large variety of pneumatic powder distributors for agricultural purposes or for extinguishing fires and any one of them could be used to produce the stream of air and suspended glass particles which is forced under an appropriate pressure through the inlet line 13.

Electrodes 9 are connected to an appropriate source of electric current by means of appropriate contacts and of flexible conductors, not illustrated. For instance the clamping means provided in body 1 to secure the rear end of each electrode may comprise a contact block which bears against the carbon electrode itself through an aperture provided in its outer covering 12. These blocks could be carried by a lower insulating cross-member which would be urged upwardly by a screw the head of which would be formed by knob 10. A conductor could be soldered to each block, body 1 being provided with lateral perforations or notches for passage of these conductors.

Body 1 further houses a valve which is interposed on the passage of the air or gas between the hollow handle 14 and tube 11. This valve may be actuated by an outer trigger-like member 15.

The spraying gun as described is started by temporarily short-circuiting the exposed ends of electrodes 9 to strike an arc between same. Member 15 is then operated. The air or gas stream issues from the free end of tube 11 with the entrained glass particles and it passes through the arc flame in which the suspended glass particles are brought to the liquid or semi-liquid state before impinging against the surface to be coated.

Sleeve 8 acts as a screen to prevent molten glass par-

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ticles from being projected laterally and further it forms a furnace wall to limit heat radiation. Further it avoids the necessity for the operator of wearing goggles.

As the electrodes are progressively burnt away under the action of the electric arc, the outer layer 12 is disintegrated or volatilized on the said electrodes as also on the free end of tube 11. The electrode ends thus remain exposed for formation of the arc and as they become progressively shorter, the free end of tube 11 is also volatilized or burnt in such manner that it never projects beyond the electrode ends. The operator may observe the position of the arc through perforations 8a and he may act on knob 6 so as to adjust the longitudinal position of sleeve 8 in conformity. In practice the arc should remain between the said perforations for a satisfactory operation.

The gun may be energized with direct current or with alternating current. In the first case the electric arc is more regular and steady, but the consumption of the electrodes is not uniform. This may be remedied by inverting from time to time the polarity of the power supply.

In the modification of FIG. 4 the spraying gun comprises three carbon electrodes 19a disposed at the corners of an equilateral triangle, the tube or nozzle 11 being situated at the center of the triangle. Such a gun is operated with three-phase alternating current. The arc thus obtained is quite steady and powerful. The electrodes burn away regularly and the apparatus may be used for coating large surfaces in a quite short time.

The glass powder may be obtained by crushing glass fragments. It may be of any colour, if desired, either by crushing coloured glass or by adding appropriate pigments to a transparent colourless glass, as for instance oxides of chromium, copper, iron, uranium, manganese, etc.

I claim:

1. A spraying apparatus for the production of a layer of glass material on a surface, comprising an assembly formed of a plurality of substantially parallel electrodes between which an electric arc is established, said assembly having a front end and a rear end, and an axis about which said electrodes are disposed; means to maintain said electric arc in the vicinity of the front end of said electrode assembly; and a heat-resistant tube extending substantially along the axis of said electrode assembly and terminating in the vicinity of the front end of said assembly to project through said electric arc a jet of a gas having glass particles in suspension therein.

2. In an apparatus as claimed in claim 1, said means to maintain said electric arc at the front end of said electrode assembly comprising an insulating layer on said electrodes, said layer being made of a heat-resistant material which may be slowly destructed by the electric arc itself.

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3. In an apparatus as claimed in claim 1, said heat-resistant tube being metallic and having a covering layer of an insulating material which may be destructed by the electric arc itself.

4. In an apparatus as claimed in claim 1, a refractory sleeve surrounding said front end of said electrode assembly.

5. A spraying apparatus for the production of a layer of glass material on a surface, comprising a supporting body; an electrode assembly formed of a plurality of substantially parallel electrodes, between which an electric arc is established, said assembly having a front end and a rear end, and an axis about which said electrodes are disposed, with said rear end being secured to said supporting body; means to maintain said electric arc in the vicinity of the front end of said assembly; a heat-resistant tube carried by said supporting body and extending substantially along the axis of said electrode assembly and terminating in the vicinity of the front end thereof to project through said electric arc a jet of a gas having glass particles in suspension therein; a bar slidably carried by said supporting body and extending in spaced parallel relation to said electrode assembly; a refractory sleeve carried by said bar to surround the front end of said electrode assembly; and means to adjust the longitudinal position of said bar with respect to said supporting body.

6. In an apparatus as claimed in claim 5, said means to maintain said electric arc at the front end of said electrode assembly comprising an insulating layer on said electrodes, said layer being made of a heat-resistant material which may be slowly destructed by the electric arc itself.

7. In an apparatus as claimed in claim 5, said heat-resistant tube being metallic and having a covering layer of an insulating material which may be destructed by the electric arc itself.

8. In an apparatus as claimed in claim 5, said refractory sleeve having two longitudinally spaced radial perforations to permit of controlling the longitudinal position of said electric arc with respect to said sleeve.

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