Oct. 20, 1936. G. DUCCINI ET AL 2,058,218

APPARATUS FOR PRODUCING VITREOUS OR METALLIC SURFACES

Filed April 17, 1934 2 Sheets-Sheet 1

Fig. 1.

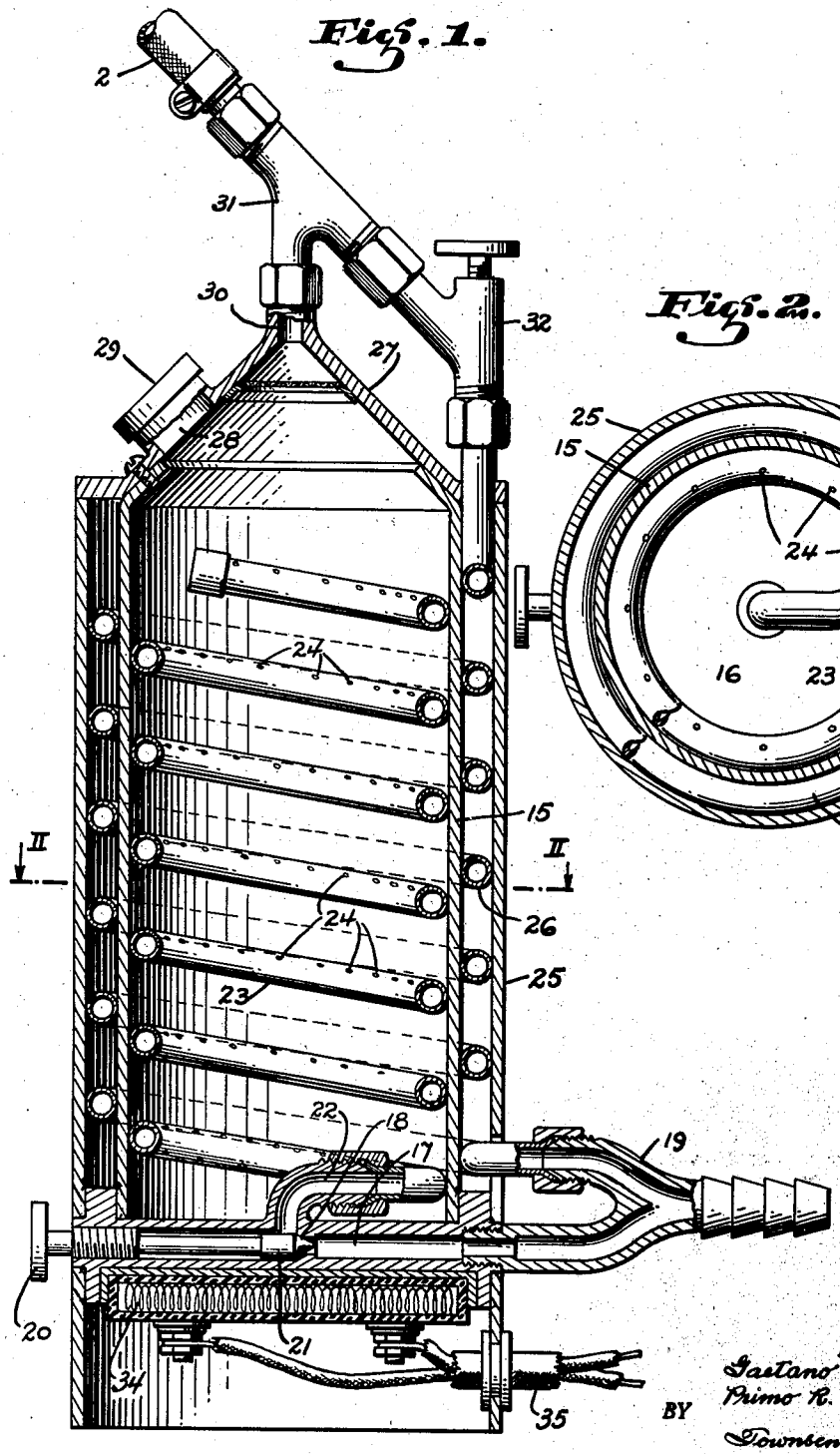


Fig. 2.

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Fig. 3.

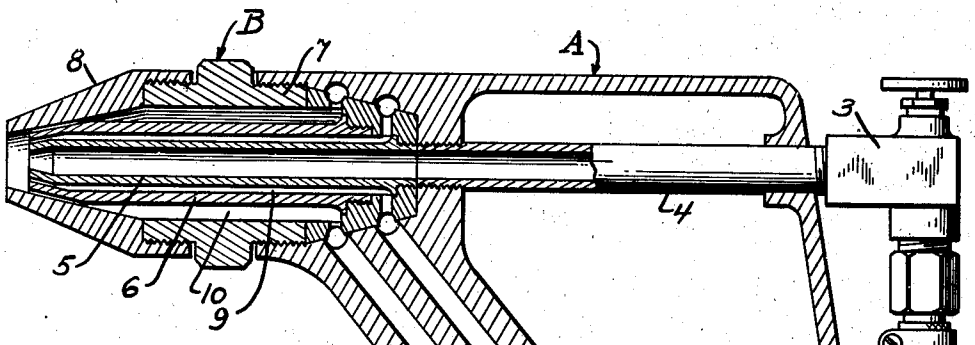
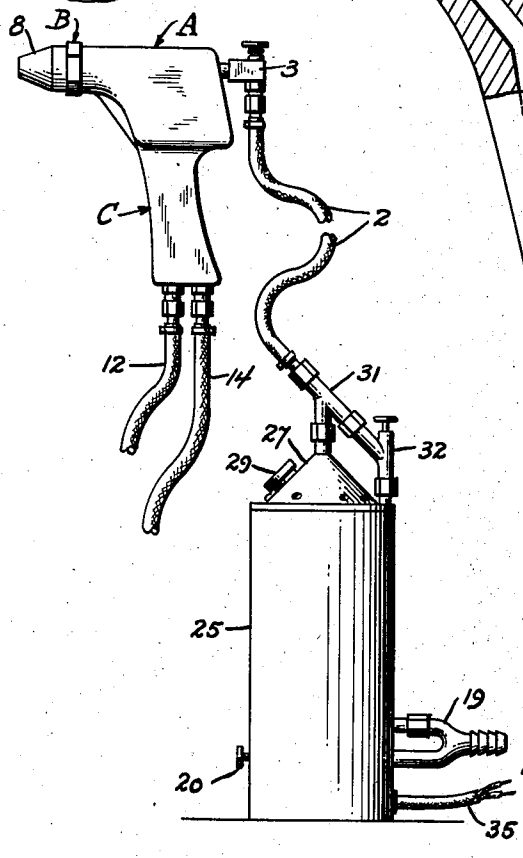


Fig. 4.





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APPARATUS FOR PRODUCING VITREOUS OR METALLIC SURFACES

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Application April 17, 1934, Serial No. 720,943

5 Claims. (Cl. 91—12.2)

This invention relates to an apparatus for producing a vitreous or metallic coating on the surface of various materials and especially to improvements on a so-called spray gun whereby metals and other materials are melted and sprayed on a surface to be coated.

In the operation of spray guns, particularly where the material to be melted and sprayed is fed to the gun in a powder form, considerable trouble has been encountered in regulating and maintaining a uniform feed. This is largely due to the mechanism employed, such as valves, etc., which tend to become clogged and also due to the presence of moisture either in the air or in the material employed, which causes the powdered material to cake or become lumpy.

The object of the present invention is generally to improve and simplify the construction and operation of apparatus of the character described, and in particular to provide a feeding mechanism whereby material in powder form may be continuously and uniformly fed, readily regulated, moisture entirely eliminated, and caking or lumping of the powdered material prevented.

The invention is shown by way of illustration in the accompanying drawings, in which—

Fig. 1 is a central vertical section of the feeding mechanism.

Fig. 2 is a cross section taken on line II—II of Fig. 1.

Fig. 3 is a vertical longitudinal section through the spray gun.

Fig. 4 is a diagrammatic view showing the manner in which the spray gun and the feeding mechanism are connected.

Referring to the drawings in detail, and particularly Figs. 3 and 4, A indicates the head, B the nozzle, and C the handle of a spray gun; the type of gun shown being that in which a powdered or pulverulent material is employed. The material is delivered by a hose line 2. It passes through a regulating valve 3 and a tube 4. This tube connects with the center tube 5 of the spray nozzle. This tube is surrounded by a second tube, indicated at 6, and this is, in turn, surrounded by an outer tubular housing 7 and a spray nozzle or tip 8. The several tubular members 5, 6, 7 and 8 are spaced apart to form annular passages therebetween, these passages being indicated at 9 and 10. Air under pressure is usually delivered to the annular passage 10 and, in this instance, the passage communicates with a duct 11 formed in the handle and this is connected with a hose 12 which, in turn, is connected with a suitable source of air supply. A second duct 13 is formed in the handle and this communicates with the annular passage 9. The duct 13 is connected with a hose 14 and this is, in turn, connected with a source of gaseous fuel supply such as natural gas, or whatever fuel is desired.

The fuel gas delivered to the passage 9 discharges outwardly through the tip 8 at a point exterior to the inner tube 5, and a flame is produced which is completely surrounded by air as air is supplied not only with the pulverulent material discharging through the tubes 4 and 5 but it is also supplied to the annular passage 10. High temperature combustion is thus obtained and the pulverulent material will obviously have to pass through this zone of high temperature combustion, and if the temperature is properly regulated, the material will become molten and will be sprayed or projected against the surface to be coated.

The apparatus so far described is of more or less standard construction. The invention in this instance consists in providing a feeding apparatus or mechanism whereby a uniform feed of pulverulent material may be delivered to the combustion zone. To obtain and maintain a uniform feed and to provide means whereby the feed may be regulated so as to readily vary or increase the amount of pulverulent material is exceedingly important when the final result is concerned. That is, non-uniformity in the feed will produce a blotchy or lumpy coated surface and this is obviously to be avoided.

In the present instance the feeding mechanism or apparatus is best illustrated in Figs. 1 and 2. It consists of an inner cylindrical container 15 to which is secured a bottom plate 16. Formed in the bottom plate is a transverse passage 17 in which is formed a valve seat 18. Connected with one end of the passage is a manifold 19 to which compressed air is delivered from a suitable source of supply by a hose or the like not shown. Projected through the opposite end of the transverse passage is a threaded stem 20 on the inner end of which is formed a valve 21. By rotating the stem through means of the handle shown, the valve may be moved to or away from the seat and the amount of air passing through the passage 17 can be regulated. Connected with the transverse passage is an elbow member 22 and connected with said elbow is a helically wound pipe 23 which is perforated throughout its length as shown at 24. The pipe extends to a point adjacent the upper end of the cylindrical container 15 and it is capped so that all air passing by the valve 21 and entering the helical passage

will be discharged through the perforations, hence if the container is filled with a pulverized material it will be kept in a constant state of turbulence due to the fact that air is being introduced into the body of pulverulent material at all points from the top to the bottom and radially into the pulverulent material. A swirling action is at the same time produced and caking or clogging of the material will obviously be prevented as the air does not only maintain the proper turbulence but it is also heated as will hereinafter be described so as to lower its relative humidity and thereby produce a drying action if there is any moisture present in the material.

Secured to the bottom section of the inner cylindrical container 15 is a jacket 25, and mounted in said jacket is a helically wound pipe 26, the lower end of which is connected with the other branch of the manifold 19. Air is accordingly supplied by the manifold not only to the inner helically wound pipe but also to the exterior pipe and the air passing therethrough will also become heated as will hereinafter be described.

Forming a closure for the upper end of the jacket and the inner container 15 is a cover member 27 which may be secured in any suitable manner and formed in the cover is a filling opening 28 which may be closed by a screw cap or the like indicated at 29. The cover member 27 is provided with an outlet 30 and this is connected with a T-fitting 31, one end of the T-fitting being connected through a valve 32 with the upper end of the helically wound pipe 26. The other end of the T-fitting is connected with a hose 2 which, as previously stated, is connected with the valve 3 and the pipes 4 and 5.

Mounted below the bottom section 16 and suitably secured thereto is an electric heating unit 34. Any type of resistance unit or other unit may be employed and current may be supplied through the wires indicated at 35. This heating unit heats the bottom section 16 upon which the pulverulent material rests and obviously heats the air passing through the passage 17, and by conduction the manifold 19 and also the lower end of the jacket 25 and the inner container 15. The lower region of the container may be maintained at practically any temperature desired, and if the pulverulent material deposited in the container carries any moisture it will be rapidly driven off. Furthermore, if the compressed air delivered to the manifold contains any moisture the heating of the air will lower the relative humidity so that a dampening or moistening effect will be entirely eliminated.

The apparatus here illustrated was particularly constructed for the purpose of applying a coating of vitreous or metallic material on different kinds of surfaces, and particularly to apply a glass coating. Where it is desired to glaze a surface, powdered glass will be introduced into the container through the filling opening 28 and when it is substantially filled the cap will be applied. Current is switched onto the heating unit 34 and in a short time sufficient heat will be developed to thoroughly dry the powdered glass and drive off any moisture contained. Air may then be turned on and the valves 20 and 32 regulated. Part of the air will thus pass directly through the pulverized material or powdered glass within the container and part of the air will pass through the helical coil 26 and the valve 32. The amount of air passing through the pulverized or ground glass is regulated by the valve 21. As the air discharges from the helical coil 26 it enters directly into the mass of pulverized or ground glass and thereby maintains it in a swirling or turbulent condition and as the air escapes through the discharge opening 30, a certain amount of pulverized glass will discharge with it, the quantity of glass discharging depending entirely upon the regulation of the valve 21 as the larger the volume of air passing through the larger will be the amount of ground glass discharging, and as the relative humidity of the air has been materially reduced due to the heating of the same any danger of moistening the pulverized material is entirely obviated and a continuous feed can be insured. The material discharges through the hose line 2 and may be further regulated by the valve 3 and it finally discharges through the pipes 4 and 5 directly into the flame or combustion zone where it is melted and projected against the surface to be coated.

Any vitreous material may be employed and, in fact, almost any metallic material in powder form. A uniform smooth coating is insured due to the constant flow of the pulverulent material and the nicety of regulation that is insured.

While the feeding apparatus shown in Fig. 1 is particularly described for use in connection with a spray gun, we wish it understood that it may also be employed for sand blasting and similar purposes as a uniform feed of sand or similar material is also in that instance of importance, and while certain features of the invention have been more or less specifically described and illustrated we wish it understood that various changes may be resorted to within the scope of the appended claims. Similarly, that the materials and finish of the several parts employed may be such as the manufacturer may decide, or varying conditions or uses may demand.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:—

1. An apparatus for feeding and regulating the flow of pulverized material comprising a container for the reception of the pulverized material, a helically wound tube extending substantially from end to end of the container, means for delivering air under pressure to said tube, a plurality of perforations formed in the tube and discharging the air radially and inwardly into the body of the pulverized material to maintain said material in a turbulent condition, said container having an outlet through which the air discharges and said discharging air carrying pulverized material with it, and means for regulating the flow of air and thereby the quantity of pulverized material discharging therewith.

2. An apparatus for feeding and regulating the flow of pulverized material comprising a container for the reception of the pulverized material, a helically wound tube extending substantially from end to end of the container, means for delivering air under pressure to said tube, a plurality of perforations formed in the tube and discharging the air radially and inwardly into the body of the pulverized material to maintain said material in a turbulent condition, said container having an outlet through which the air discharges and said discharging air carryng pulverized material with it, means for regulating the flow of air and thereby the quantity of pulverized material discharging therewith, and means for heating the pulverized material and the air passing through it.

3. An apparatus for feeding and regulating the

flow of pulverized material comprising a container for the reception of the pulverized material, a helically wound tube extending substantially from end to end of the container, means for delivering air under pressure to said tube, a plurality of perforations formed in the tube and discharging the air radially and inwardly into the body of the pulverized material to maintain said material in a turbulent condition, a discharge conduit connected with the container into which the air discharges, said discharging air carrying pulverized material with it, and means for regulating the flow of air and thereby the quantity of pulverized material discharging therewith.

4. An apparatus for feeding and regulating the flow of pulverized material comprising a container for the reception of the pulverized material, a helically wound tube extending substantially from end to end of the container, means for delivering air under pressure to said tube, a plurality of perforations formed in the tube and discharging the air radially and inwardly into the body of the pulverized material to maintain said material in a turbulent condition, a discharge conduit connected with the container into which the air discharges, said discharging air carrying pulverized material with it, means for regulating the flow of air and thereby the quantity of pulverized material discharging therewith, a conduit for delivering additional air to the discharge conduit, and means for regulating the flow of said secondary supply of air.

5. An apparatus for feeding and regulating the flow of pulverized material comprising a container for the reception of the pulverized material, a helically wound tube extending substantially from end to end of the container, means for delivering air under pressure to said tube, a plurality of perforations formed in the tube and discharging the air radially and inwardly into the body of the pulverized material to maintain said material in a turbulent condition, a discharge conduit connected with the container into which the air discharges, said discharging air carrying pulverized material with it, means for regulating the flow of air and thereby the quantity of pulverized material discharging therewith, a conduit for delivering additional air to the discharge conduit, means for regulating the flow of said secondary supply of air, and means for heating the pulverized material and the air employed for the discharge and conveyance of the pulverized material.

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