A. G. BAGNALL & J. A. TAYLOR.

NOZZLE FOR APPLYING ADHESIVE COATING MATERIAL.

APPLICATION FILED JUNE 16, 1916.

1,239,075.

Patented Sept. 4, 1917.

2 SHEETS—SHEET 1.

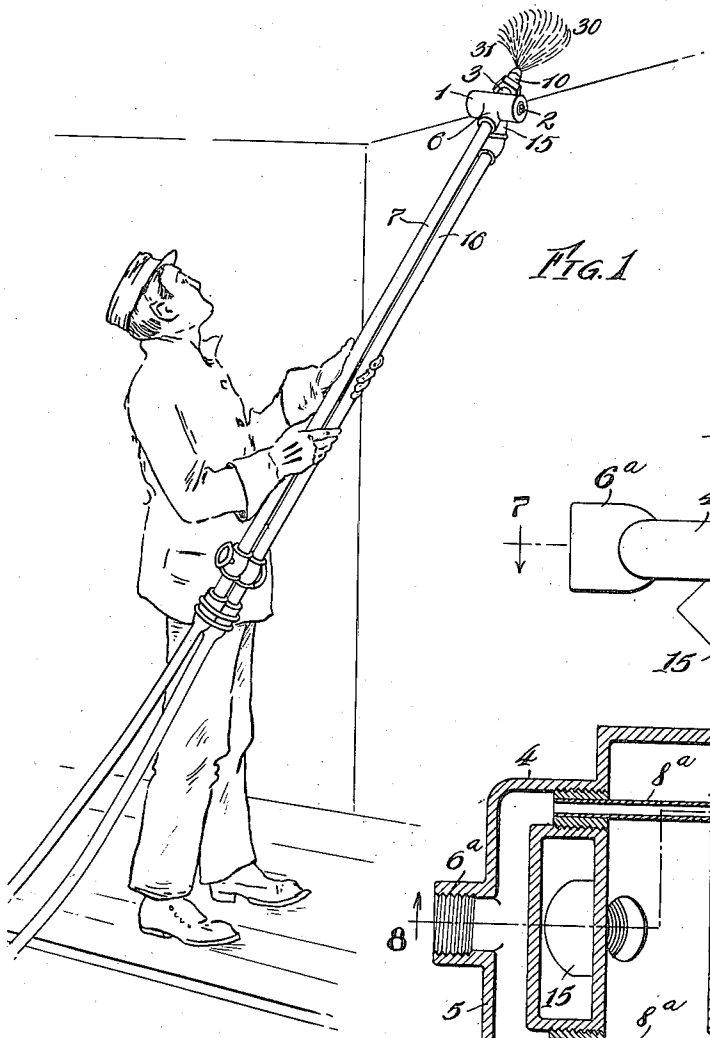
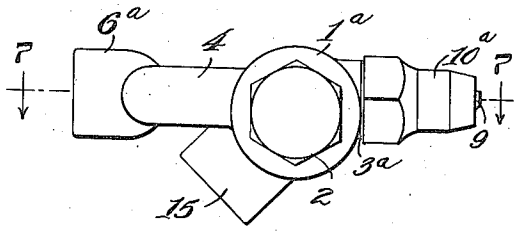


FIG. 1

FIG. 6



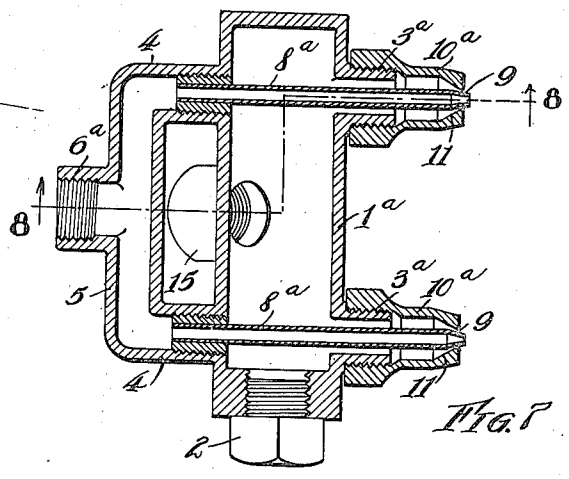
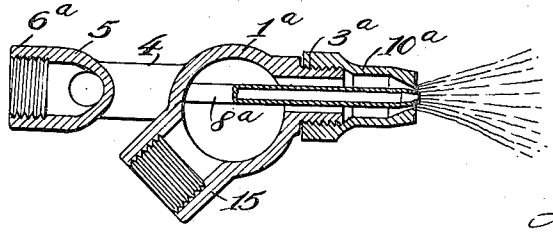


FIG. 7

FIG. 8



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2 SHEETS—SHEET 2.

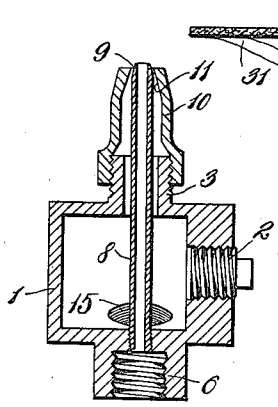


Fig. 3

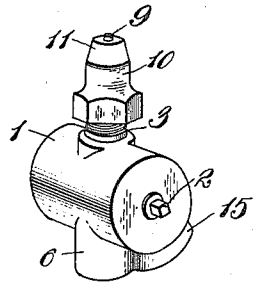


Fig. 2

Fig. 4

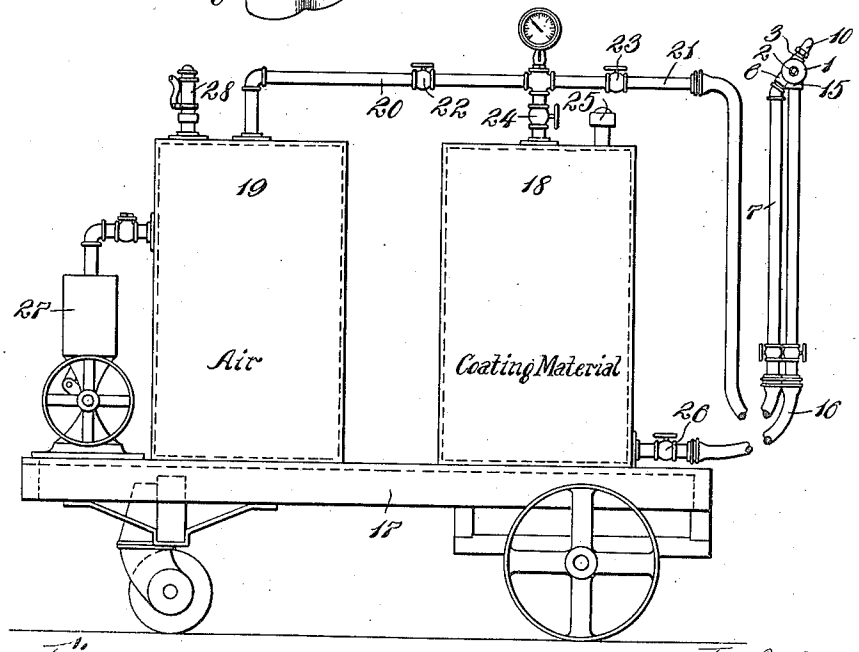


Fig. 5

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UNITED STATES PATENT OFFICE.

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NOZZLE FOR APPLYING ADHESIVE COATING MATERIAL.

1,239,075. Specification of Letters Patent. Patented Sept. 4, 1917.

Application filed June 16, 1916. Serial No. 103,950.

To all whom it may concern:

Be it known that we, (1) ARTHUR G. BAGNALL, (2) JAMES A. TAYLOR, residing at (1) Cleveland, (2) Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Nozzles for Applying Adhesive Coating Material, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to the art of coating surfaces, and has particular reference to nozzles whereby a surface may be coated with an adherent film of adhesive, tenacious, ductile material such as certain paints, particularly those having an asphaltic base, although our invention is not restricted to the use of any particular materials. It has very frequently been proposed to apply coating materials by means of air pressure, but so far as we are aware the nozzles employed have always been such as effected an atomizing of the coating material and its application to the surface in the form of a great number of extremely small pellets. The size of these particles is so extremely small compared with the distance which they pass over before reaching the surface which is ordinarily so very great (assuming a nozzle distance of 6 to 8 inches the proportion is comparable to throwing a gallon of paint a mile through the air) that the material always reaches the surface in a much different condition from that which it possessed at the start. The fineness of the particles produces a very rapid evaporation of the volatile constituents, particularly if it be some product like naphtha which is frequently used with asphaltic media, or a degree of oxidation in case the paint contain linseed oil or similar products. Also in addition to these changes the paint applied by this atomizing nozzle is mixed with air so as to form a kind of emulsion which frequently fails to become solidified.

The object of the present invention is the provision of a nozzle by which paints and other coatings of this nature may be applied without this atomizing action but rather in the form of a continuous film; the provision of a device whereby coating material may be drawn in midair into a thin continuous film, and this film deposited upon the surface to be coated; the provision of a nozzle whereby a previously formed paint film may be forced against and into the surface being coated; the provision of a nozzle whereby paints, even those containing a large portion of volatile matter may be applied without deterioration; while other objects and advantages will become apparent as the description proceeds.

Certain embodiments of our invention are illustrated in the drawings accompanying and forming a part of this application, wherein Figure 1 is a view showing our improved nozzle in use; Fig. 2 is a separate perspective view of the said nozzle; Fig. 3 is a vertical sectional view through the same; Fig. 4 illustrates the mode of operation of the said nozzle; Fig. 5 represents an elevation of a system of tanks which may be employed therewith; Fig. 6 is an end elevation of a modified form of nozzle; Fig. 7 is a sectional view taken on the line 7—7 of Fig. 6; and Fig. 8 is a sectional view on the broken line 8—8 of Fig. 7.

Describing by reference characters the parts shown in the drawings, 1 represents the body of our improved nozzle which is preferably of cylindrical shape having one end closed by a removable clean-out plug 2. Projecting radially from one side of the body is a hollow threaded nipple 3 and opposite thereto is a hollow radial internally threaded nipple 6 in which is secured the hollow handle 7. The inner end of the nipple 6 is reduced in some manner, in Fig. 3 by an integral web, in which is secured a jet tube 8 which traverses the body and projects centrally through the nipple 3. Threaded upon the nipple 3 is the hollow screw cap 10, preferably having a constricted portion 11 adjacent its end which surrounds the tapered end 9 of the jet tube.

The side of the body 1 is formed at a suitable point with a hollow threaded socket 15 adapted for the reception of the flexible hose 16, and for delivering air and coating material in suitable proportions to the nozzle we may employ the arrangement illustrated in Fig. 5. This consists of a cart having a platform 17 upon which are supported two tanks 18 and 19, the former for coating material and the latter for air. The upper end of the tank 18 communicates with the tank 19 through a suitable pipe 20, and with the jet tube 8 of the nozzle through the

pipe 21, suitable valves 22, 23, 24 being provided so that the relative flow of air may be regulated according to any desired proportion. An automatic blow-off valve 25 of some suitable or approved construction is preferably provided so that a constant pressure can be maintained within this tank without attention, and the lower part of the tank 18 is placed in communication with the hose 16 as by the valved connection 26. The tank 19 is supplied with air by a suitable pump 27, a blow-off or safety valve 28, or other suitable arrangement, being provided whereby its pressure may be maintained constant without attention.

With the parts constructed and arranged as illustrated, upon a suitable adjustment of the valves 22, 23, 24, 26 a certain pressure may be produced upon the coating material having any desired relation to the pressure in the jet pipe, with the result that the coating material is extruded through the nipple 11 in the form of an annular stream, into the center of which is introduced the air passing through the jet pipe 8. The pressure in the jet pipe is generally maintained at a higher point than the pressure upon the paint, but whatever be their relative pressures the fact that the one is an expansible gas and the other a tenacious liquid will cause the former to expand the latter into the condition of a continuous thin film wholly without atomizing or segregation. The continuous forward movement of the stream, coupled with the expanding movement of the air serves to give the issuing material a more or less conical form, the angle of the cone depending upon the comparative pressures upon the two fluids, the tenacity of the coating material, and the proximity of the nozzle to the surface. The thickness of the film deposited will depend in part upon the adjustment of the nipple 10 which determines the thickness of the stream, upon the pressure of the air which determines the rapidity of the expansion of said stream, and upon the distance between the nozzle and the surface, which largely determines the amount of expansion. In fact if the distance be too great there will be a tendency for portions of the film to become torn bodily away from the remainder and to float in the air like a thin veil. With the correct proportioning of these quantities the jet will assume substantially the shape shown in Fig. 4, and as the nozzle is moved from one point to another with reference to the surface being coated, the tenacity of the film will cause it to become rolled under at one side as indicated at 30 and to trail at the other side as indicated at 31. The air pressure upon this rolled-under portion drives it strongly into the pores and against the surface of the structure and the trailing portion 31 falls thereon and becomes incorporated therewith. If the nozzle be moved rearwardly, this superposed layer 31 is covered by yet another film caused by the rolled-under advance side of the liquid sheet, and the two films together forced against the surface of the wall. By thus moving the nozzle back and forth a layer of any desired thickness may be built up, but being built of these thin plies each of which is solidly packed into place, a peculiarly dense and adherent coating is produced.

In case it be desired to cover the surface more rapidly we propose to employ a multiple nozzle, which may if desired be constructed as shown in Figs. 6, 7 and 8 in which 1^a represents the body or barrel having on one side a plurality of threaded nipples 3^a—3^a and opposite thereto the branches 4—4 connected by a manifold 5 which in turn is provided with the internally threaded nipple 6^a. Suitably secured in each of the branches 4—4 is a jet tube 8^a which projects centrally through the opposite nipple 3^a, and is surrounded by the screw cap 10^a as before. It will be obvious that this duplication could be carried to any desired extent.

In operation the cap 10 is preferably adjusted so that the jet pipe 8 projects slightly beyond the end thereof so that the air issuing therefrom may not be delivered into the annular liquid stream until after its emergence from the nozzle. The cap may be adjusted outwardly as far as the end of this jet tube if desired, but very little if any beyond that since otherwise an atomizing effect will be produced by interaction of the air stream with the edge of the cap.

From the foregoing explanation it will be seen that many changes in detail can be made without sacrificing the benefits of our invention, and the limits of those changes will be substantially manifest; accordingly we do not limit ourselves to the details of construction and arrangement herein described except as the same are positively included in the claims hereto annexed or rendered necessary by the prior state of the art.

Having thus described our invention, what we claim is:—

1. In a device of the character described, a cylindrical hollow body, a laterally projecting hollow nipple carried thereby and communicating with the interior of said body, a jet tube smaller than the nipple and projecting laterally through said body and centrally through said nipple, a longitudinally adjustable cap carried by said nipple, said jet tube also projecting through said cap, said cap having in its end a central aperture concentric with said tube, means for supplying liquid to the interior of the body, and means for supplying gas under pressure to said jet tube.

2. In a device of the character described, a hollow nipple, a tube smaller than the

nipple projecting centrally therethrough, a longitudinally adjustable cap carried by said nipple and having in its end a central aperture concentric with said tube, said tube also projecting through said cap, the end of said tube and the interior surface of said cap being tapered inwardly one at a sharper angle than the other, means for supplying liquid under pressure, to the interior of said nipple, and means for supplying gas under pressure to the interior of said tube.

3. In a device of the character described, a hollow body, a hollow nipple projecting therefrom, a longitudinally adjustable hollow cap carried by said nipple and having an aperture in its end, a jet tube projecting centrally through said aperture to a point beyond the end of said cap, the end of said tube being tapered inwardly, and the interior wall of said cap being flared inwardly at a sharper angle than the end of said tube, means for supplying viscous liquid under pressure to the interior of said body, and means for supplying gas under pressure to said jet tube.

4. In a device of the character described, a cylindrical hollow body, a hollow nipple projecting laterally therefrom and communicating therewith, a tube smaller than the nipple laterally traversing said body and projecting centrally through and beyond said nipple, a hollow cap threaded upon said nipple and having at its end an aperture substantially the same diameter as the exterior of said jet tube, the exterior of said tube and the interior of said cap being inwardly tapered, said cylindrical body having a removable plug in the end thereof and connections for supplying different fluids to the interior of said body and to said jet tube.

5. In coating apparatus a container for viscous liquid under pressure, a nozzle having an annular discharge orifice communicating with the lower portion of said container and also having a jet passage concentric with and passing through the annular passage and projecting beyond said nozzle, and means for supplying air under pressure to the upper part of said container and to said jet passage in proportion as desired.

6. In a nozzle, a hollow body having oppositely projecting threaded nipples, a hollow handle connected with one of said nipples, a hollow cap adjustably threaded to the opposite nipple, said cap having a central bore, a jet tube projecting centrally through said bore to a point at least as far as the end of said cap, said tube traversing said body and communicating with said handle through the other nipple, a hose connection carried by said handle, and a flexible conduit communicating with said body.

7. In coating apparatus a container for viscous liquid under pressure, a nozzle having a discharge orifice communicating with the lower portion of said container and also having a jet passage opening into the center of the stream issuing from said orifice and at a point beyond said orifice, and means for supplying air under pressure to the upper part of said container and also to said jet passage.

In testimony whereof we hereunto affix our signatures.

ARTHUR G. BAGNALL.
JAMES A. TAYLOR.