

(No Model.)

3 Sheets—Sheet 1.

A. FISHER.
PNEUMATIC PAINTING NOZZLE.

No. 584,864.

Patented June 22, 1897.

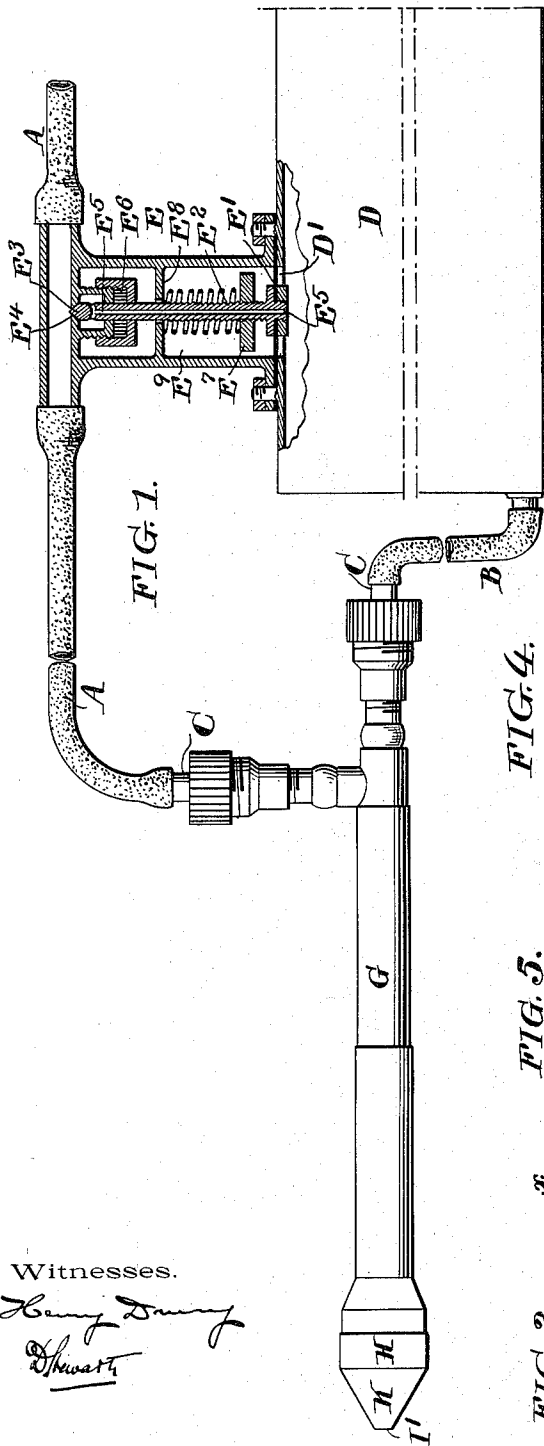


FIG. 1.

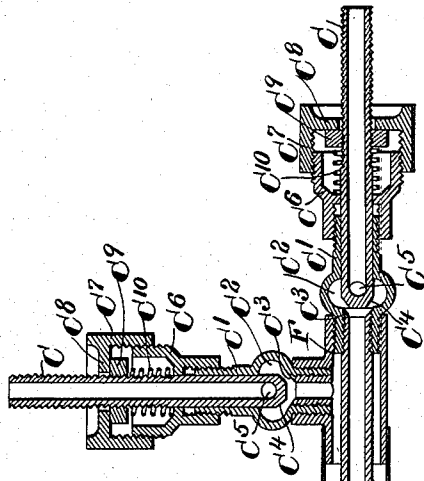


FIG. 2.

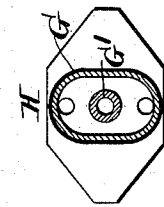


FIG. 3.

FIG. 4.

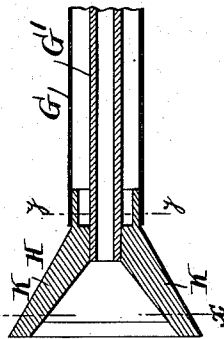


FIG. 5.

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(No Model.)

3 Sheets—Sheet 3.

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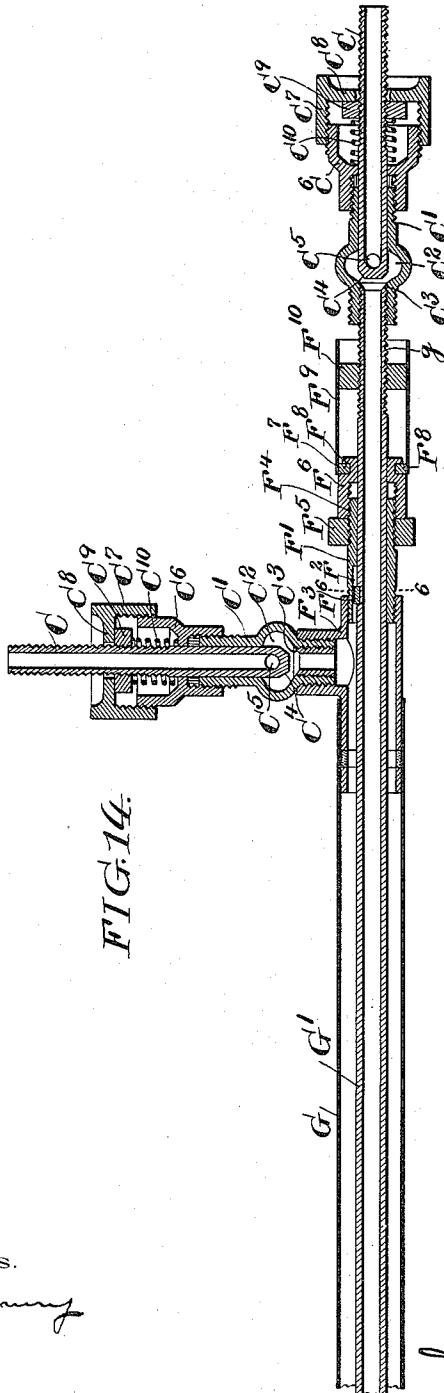


FIG. 14.

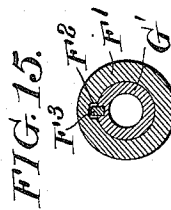


FIG. 15.

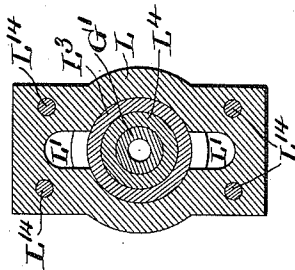


FIG. 12.

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UNITED STATES PATENT OFFICE.

ABEL FISHER, OF WELLSVILLE, OHIO.

PNEUMATIC PAINTING-NOZZLE.

SPECIFICATION forming part of Letters Patent No. 584,864, dated June 22, 1897.

Application filed January 7, 1896. Serial No. 574,579. (No model.)

To all whom it may concern:

Be it known that I, ABEL FISHER, a citizen of the United States, residing in Wellsville, in the county of Columbiana, in the State of Ohio, have invented a certain new and useful Improvement in Pneumatic Painting-Nozzles, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to devices known as "pneumatic painting-nozzles," by which a spray of paint is caused by means of a jet or jets of compressed air to impinge against the object to be painted; and the object of my invention is to provide certain improvements in devices of this character the nature of which will be best understood as described in connection with the drawings in which they are illustrated, and in which—

Figure 1 is a side view representing a pneumatic painting-nozzle constructed in accordance with some of the particular features of my invention and shown in connection with certain devices for effecting a proper regulation in the supply of air and paint delivered to the nozzle. Fig. 2 is a central longitudinal section of the nozzle shown in Fig. 1. Fig. 3 is a cross-section through the end of the nozzle, taken as on the line *x x* of Fig. 5. Fig. 4 is a cross-section taken on the line *y y* of Fig. 5, and Fig. 5 is a longitudinal section taken on the line *z z* of Fig. 2. Figs. 6 to 15, inclusive, are views illustrating a somewhat more complicated embodiment of my invention, Figs. 6 and 7 indicating sectional views taken at right angles to each other through the head or delivery end of the painting-nozzle. Fig. 8 is a cross-sectional view on the line 1 1 of Fig. 6; Fig. 9, a section on the line 2 2 of Fig. 6; Fig. 10, a section on the line 3 3 of Fig. 6; Fig. 11, a section on the line 4 4 of Fig. 6; Fig. 12, a section on the line 5 5 of Fig. 6. Fig. 13 is a perspective view of a casting used in forming the air and paint chambers and designated by the letter *J*². Fig. 14 is a longitudinal section through the rear end of the nozzle indicated in Figs. 6 and 7, and Fig. 15 is a cross-section on the line 6 6 of Fig. 14.

A and B, Fig. 1, indicate, respectively, the supply-pipes for compressed air and paint.

Each of these pipes in the construction shown terminates in a hollow valve-rod C, which is a direct attachment to the painting-nozzle. 55

D is a receptacle for paint, having an opening D'. Above the paint-level E is a regulating-valve by which the compressed-air pipe A is placed in communication with the upper part of the receptacle D. As shown, a flexible diaphragm E' is secured across the opening D', and secured to this diaphragm and passing through a hole in the center thereof is a hollow valve-spindle E², the end E³ of which seats itself on the sides E⁴ of an opening in the air-pipe. 65

E⁵ indicates the passage through the spindle E², and by this passage the pipe A communicates with the receptacle D when the valve E³ leaves its seat. 70

E⁶ indicates a stuffing-box for the upper end of the spindle E²; E⁷, a nut screwing on the threaded lower part of the spindle E²; E⁸, a spring-abutment, and E⁹ a spring situated between the nut E⁷ and the abutment E⁸. 75

The device is a familiar pressure-regulating valve in kind, and by a proper adjustment of the spring E⁹ the valve is opened and communication established between the air-pipe and paint-chamber whenever the pressure in the chamber appears less than a determined ratio to the pressure in the pipe, while on attaining this ratio the pressure in the receptacle D, acting on the diaphragm E', closes the regulating-valve. By using this device I secure a uniform ratio of pressure in the air-pipe and paint-receptacle and consequently a proper relative supply of air and paint through the pipes A and B. 80

I have already referred to the hollow valve-stems C, which may be said to form a part of the supply-conduits leading to the nozzle. Each of these stems C fits and slides in the outer parts of chambers C', the inner ends of which are secured one to the air-pipe G and the other to the paint-pipe G'. As shown, these chambers are formed with an enlargement C² and with valve-seats C³, upon which the valves proper, C⁴, formed at the ends of the pipes C, can seat themselves, so as to cut off all passage of fluid. 85 90 95 100

C⁵ C⁵ indicate lateral openings from the hollow spindles C, by which they are placed in connection with the enlargements C² of the

chambers C'. Secured to the outer end of the chambers C' are annular extensions C⁶, upon the threaded outer peripheries of which screw the heads C⁷ C⁸, C⁹ C⁹ indicating nut secured to the spindles C, and C¹⁰ a spring operating against such nut at one end and against a shoulder on the device C⁶ at the other. The annular rim C⁸ of the head C⁷ C⁸ rests against the nut C⁹, which is always pressed outward by the spring C¹⁰, said spring tending to keep the valve C⁴ away from its seat.

It is obvious that the valve in the construction shown can always be closed by a simple longitudinal thrust on the valve-stem C; also that it can be permanently closed by screwing the head C⁷ C⁸ down, and that the extent to which it will open will always depend upon the position of said head. This device I have found to be exceedingly useful by reason of its double capacity of acting as a regulating-valve and of being capable of instant action to close the supply-conduit when such closure is desired.

In Fig. 14 I have shown a construction of the butt-end of the painting-nozzle by which the inner or paint tube of the nozzle can be moved longitudinally. In this case a two-way pipe-joint is indicated at F, said pipe-joint having the usual T-form, the air-supply conduit entering at the side of the joint. A hollow plug F' screws into the inner end of the T F, and is provided with a slot, as indicated at F², into which slot fits a feather or projection F³, which is secured to the paint-pipe G', which passes through the plug. The outer end of the plug is threaded at F⁴. There is secured upon it a stop-nut F⁵ and an adjusting-nut F⁶, said adjusting-nut having an annular groove at its end, in which fits a ring F⁸, to which ring is attached a sleeve F⁹, to which sleeve is also attached a nut F¹⁰, screwing upon a threaded portion g of the tube G'. It will readily be seen that by turning the sleeve F⁹, which remains stationary with regard to the plug F', the action of the nut F¹⁰ will be to force the tube G' backward or forward, as the case may be, the turning of this tube being prevented by the feather F³.

G and G' are concentric tubes forming a part of the paint-nozzle and conveying, respectively, air and paint to the head of the nozzle, (indicated at II.)

Referring first to the construction of the head II, (indicated in Figs. 1 to 5, inclusive,) it will be noticed that the head is divided into three chambers I I and J, J being connected with the pipe G' and I I being connected with the pipe G. Each of the chambers is alike in having side walls which converge outward and under walls which diverge upward, and the inner walls of the air-chambers form the walls of the paint-chamber, each chamber having a broad and narrow orifice, (indicated at J' and at I² I³,) while the outer walls of the air-chambers, extending beyond the inner walls, form a nozzle I', through which the sprayed paint issues. It will also be noticed that the ori-

fices of the air-chambers are arranged in such a way with respect to the orifice of the paint-chamber and with respect to each other that the issuing jets of air are thrown out in converging planes which intersect each other immediately in front of the paint-nozzle. This construction is the principal feature of my invention. The narrow and broad air-jets acting upon the similarly-shaped jet of paint break it up into an exceedingly fine and uniform spray which is delivered in a broad and narrow form upon the object to be painted. I would also note in this connection that it is quite important that the air and paint chambers should be of substantially the form indicated, as in this way each of these terminal chambers forms a reservoir for the fluid which is of considerable size with respect to the orifice through which the fluid is delivered and in which the pressure of the fluid delivered from the concentric pipes G G' is equalized before the issuance of the jet.

Referring next to the construction of the nozzle-head, (indicated in Figs. 8 to 13,) I would state, in the first place, that the nozzle here indicated has all the features of the nozzle heretofore described, and, in addition, a mode of construction by which the breadth of the orifices J' and I' is capable of adjustment, and by which, indeed, the orifice J³ can be entirely closed. Referring now to the details of construction shown in these figures, L indicates a cast-iron terminal or end piece for the air-pipe G, and is formed with grooves, as indicated at L' L'. Secured upon the end of this terminal L is a base-plate L², held in place, as shown, by means of screws L¹⁴ and having a rubber gasket M between it and the terminal L. This base-plate is formed with openings which register with the grooves L' and which, as shown, are continued as pipes L⁶, opening into the air-chambers I I and by which the said air-chambers are placed in communication with the air-pipe G. In the center of the base-plate, as shown, is a stuffing-box projection L³, L⁴ indicating a nut screwing into this stuffing-box and L⁵ packing compressed in the box and against the pipe G' by said nut.

L⁷ indicates a flexible metallic plate, to the center of which the paint-pipe G is secured, as by a nut L⁸, the said paint-pipe passing through an opening in the plate and entering the chamber J.

L⁹ L⁹ indicate metal plates secured at the respective ends of the flexible plates L⁷, and L¹⁰ L¹⁰ indicate screws by which the castings J² are secured to the plates L⁹ and to the ends of the plate L⁷.

L¹² L¹² indicate screws by which the plate L⁷ is secured to the plate L², and L¹³ indicate plates forming the diverging walls of the paint and air chambers.

M' indicates a spring-cushion, preferably of rubber, which is situated between the base-plate L² and the flexible plate L⁷.

N and N' indicate leather gaskets.

J² indicates castings which are secured to the flexible plate L⁷ by the screws L¹⁰, which screws unite the plates L⁹ L⁷ and the castings J² together. The walls J³ of the paint-chamber J, which are also the inner walls of the air-chambers, are formed by these castings, which also form the diverging walls of the air-chambers, the outer converging walls of the air-chambers being formed of a flat plate 10 screwed upon the face J⁴ of the casting J², which is of proper form to receive them. It will be noticed that the gasket N not only passes beneath the plate L⁷, but is continued up so that it lies between the plates L¹³ and 15 the sides of the castings J², and in order to make the end walls of the paint-chamber J² flare conveniently outward I prefer to employ rubber cushions, as indicated at M², which fill up the unnecessary space and also by reason 20 of their resiliency assist in the action of the rubber cushion M¹.

The operation of the device is very simple. If the pipe G' is moved outward, it (or rather in the construction shown the rubber cushion 25 M¹) will force the plate L⁷ to take a curved position, with its center bulging outward. The result of this is to move the two castings J² apart from each other at their ends, thus increasing the openings at J' and I'. On the 30 other hand, a backward movement of the pipe G' will draw the center of the plate L⁷ backward until it assumes a level position, as indicated in Fig. 6, or until it bulges inward, this action of course drawing the ends of the 35 castings J² together and closing or tending to close the orifice J' I'.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

40 1. A pneumatic painting-nozzle having in combination a long and narrow exit-passage for paint and two long narrow and sharply-converging exit-passages for air situated above and below the paint-exit and so as to 45 throw converging air-jets which intersect each other in front of and close to the paint-orifice.

2. A pneumatic painting-nozzle having in combination a long and narrow exit-passage 50 for paint and two long narrow and sharply-converging exit-passages for air situated above and below the paint-exit, the outer walls of the air-exits extending beyond the walls of the paint-exit, all substantially as 55 and for the purpose specified.

3. A pneumatic painting-nozzle having tubular supply-pipes for air and paint and a head H formed with a paint-chamber J having converging side walls, diverging end walls 60 and a long and narrow exit-orifice J' in combination with two air-chambers situated on each side of the paint-chamber said air-chamber also having converging sides and diver-

ging ends and having also exit-orifices I² I² lying parallel to the paint-orifice and inclined 65 as specified and so that the air-jets will intersect each other in front of the paint-orifice, the air and paint chambers being of larger cross-sectional area than the supply-pipes leading thereto. 70

4. A pneumatic painting-nozzle having a head H formed with a paint-chamber J having converging side walls, diverging end walls and a long and narrow exit-orifice J' in combination with two air-chambers situated on 75 each side of the paint-chamber, said air-chambers also having converging sides and diverging ends and having also exit-orifices I² I² lying parallel to the paint-orifice and inclined as specified and so that the air-jets will inter- 80 sect each other in front of the paint-orifice, a paint-supply pipe G' leading to the paint-chamber and an air-supply pipe G surrounding the paint-pipe and communicating with 85 each air-chamber, the cross-sectional area of the chambers in the head being larger than their supply-pipes.

5. A pneumatic painting-nozzle having in combination a base-plate L², a flexible plate 90 L⁷, a spring-cushion M¹ situated between said plates, air-chambers I I secured to opposite sides of the plate L⁷ and arranged as described so that their inner walls form a paint-chamber J, an air-pipe G, passages as L⁶ L⁶ leading 95 from said pipe to the air-chambers, a paint-pipe G' having its end secured to the center of plate L⁷ and means for moving the paint-pipe longitudinally as described and whereby the ends of the air-chambers are made to approach or recede from each other and the 100 opening of the paint-chamber made more or less.

6. In combination with a pneumatic painting-nozzle having concentric supply-pipes for paint and air, one or more regulating-valves 105 consisting of a hollow valve-stem C having lateral openings and a terminal valve C⁴ adapted to seat itself in a supply-pipe, a spring arranged to hold said valve off of its seat while permitting it to seat itself by pressure 110 on the valve-stem and an adjustable head C⁷ C⁸ whereby the normal position of the valve can be regulated.

7. In combination with a pneumatic painting-nozzle having supply-pipes for paint and 115 compressed air, a paint-receptacle from which the paint-pipe leads to the nozzle a connection from the air-pipe to said receptacle and a pressure-regulating valve situated in said connection whereby the pressure in the re- 120 ceptacle is maintained in a fixed ratio to the air-pressure in the air-pipe.

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Witnesses:

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