E. ECKART.

SPRAYING DEVICE.

APPLICATION FILED JUNE 25, 1918.

1,315,765. Patented Sept. 9, 1919.

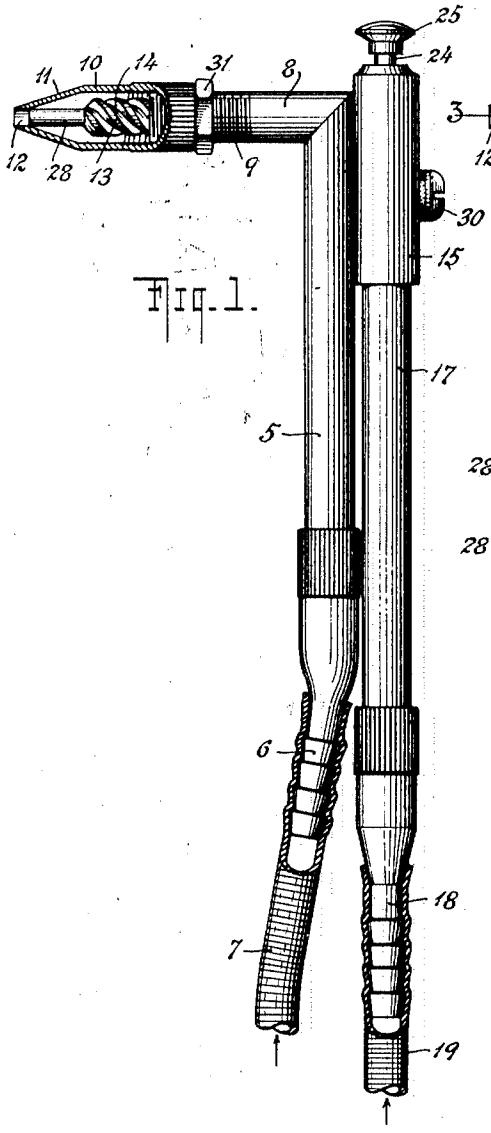


Fig. 1.

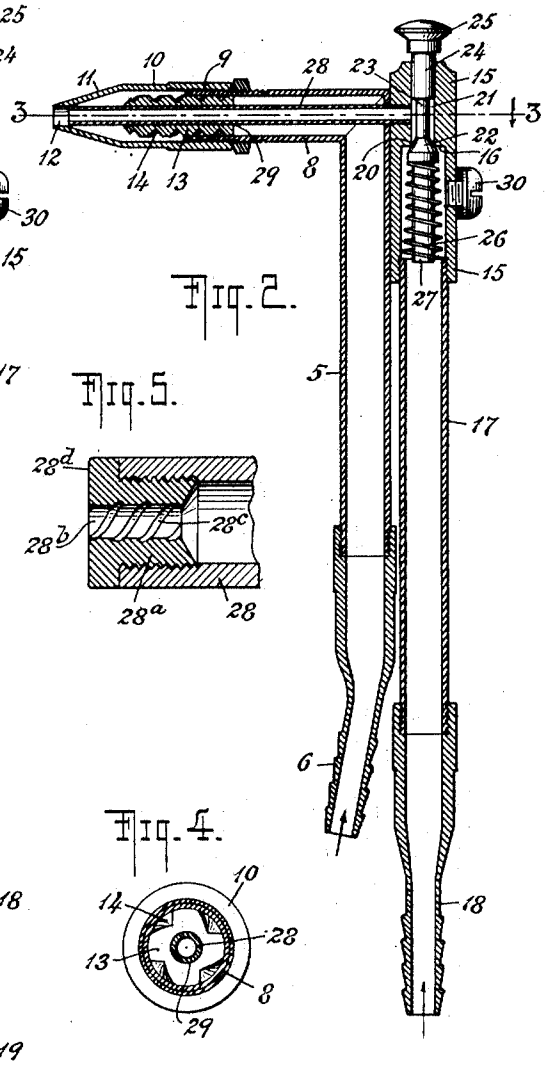


Fig. 2.

Fig. 5.

Fig. 4.

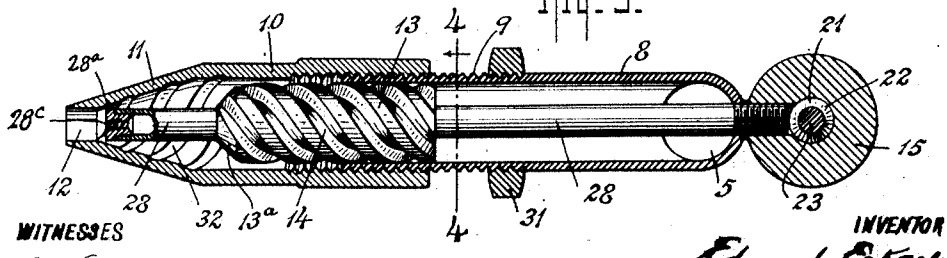


Fig. 3.

WITNESSES

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SPRAYING DEVICE.

1,315,765. Specification of Letters Patent. Patented Sept. 9, 1919.

Application filed June 25, 1918. Serial No. 241,781.

To all whom it may concern:

Be it known that I, EDMUND ECKART, a citizen of the United States, and resident of New Rochelle, county of Westchester, State of New York, have invented a certain new and useful Improvement in Spraying Devices, of which the following is a specification.

My invention relates to spraying devices and more particularly to the type of such devices commonly known as air brushes and used principally for the spraying of paints, colors, lacquers, varnishes and oils of all kinds, including fuel oil. The object of my invention is to provide a construction in which the spray is given a whirling motion as it leaves the nozzle; a further object is to provide a construction which may be adjusted at said nozzle to change the character of the spray or to shut it off entirely and in which at every adjustment the spray is uniform and efficient. In addition, my invention contemplates a device in which the details of construction are reduced to the simplest form, which is efficient and economical in operation and which may be readily cleaned and maintained in a condition of maximum efficiency. Other more specific objects will appear from the description hereinafter and the features of novelty will be pointed out in the appended claims.

In the accompanying drawings, which for illustrative and descriptive purposes show an example of my invention, Figure 1 is an elevation, partly in section; Fig. 2 is a longitudinal section; Fig. 3 is a sectional view, on an enlarged scale, taken on the line 3—3 of Fig. 2; Fig. 4 is a cross-section on the line 4—4 of Fig. 3; and Fig. 5 is an enlarged detail section showing a reducing nozzle which forms part of my device.

As shown in the illustrated example, the device comprises a pipe 5, preferably having a relatively reduced end portion 6, adapted to receive one end of a flexible tube or the like, 7, whereby said pipe 5 is connected with a source of supply of material to be sprayed which may be a paint, color, lacquer, varnish, oil, or the like. The section 8 of the pipe 5 preferably extends at substantially right angles to the main section thereof and is screw-threaded at 9 for the accommodation of an internally screw-threaded cap 10 which, in the illustrated example, is constructed with a tapering outer end 11 forming the exit nozzle 12, the inner surface of which is preferably parallel with the axis of the cap 10. It will be understood that if desired the inner surface of the end 11 alone may be made to converge toward the nozzle 12 or be constructed in an equivalent manner, the form or construction of the outer surface of said end 11 being of no consequence so far as the operation of the device is concerned, and being constructed in the form shown merely for convenience and in order to produce a neat and symmetrical appearance.

A plug 13 is located in the end of the pipe section 8 and is secured therein in any suitable manner, as, for instance, by frictional engagement with the inner surface of said section 8. The plug 13 projects beyond the end of the said pipe section 8 into the cap 10 and has its outer end preferably beveled as indicated at 13^a at an angle corresponding to the inclination of the inner surface of outer end 11 of the cap 10 for the purpose to be more fully set forth hereinafter; in the normal, operative condition of the parts, the outer end of said plug 13 is located approximately at or in close proximity to the point at which said tapering outer end 11 begins, as shown in Figs. 2 and 3. A helical or spiral channel 14 is formed on the outer surface of the plug 13 and extends continuously throughout the axial length thereof, so that one end of said channel 14 communicates with the pipe section 8 and the other with the cap 10; beyond the end of the pipe section 8 the channel 14 is also open in radial outward directions, as shown best in Figs. 1 and 3.

A valve member 15 is located at the upper end of the pipe 5 in parallel and exterior relation thereto and is preferably secured rigidly to said pipe 5 in any suitable manner as by soldering or the like. The member 15 is formed with a valve chamber 16 internally screw-threaded at its one end for the accommodation of an externally screw-threaded pipe 17; with this arrangement the pipe 17 is detachably connected with the member 15 and may be disconnected therefrom when this is desired, for instance, to examine the valve 22 or the interior of the chamber 16. The pipe 17 may be formed, with a reduced free end portion 18 arranged to receive one end of a flexible tube or the like 19 whereby said pipe 17 and its coöperating parts are connected with

a source of compressed air or other gaseous medium.

The inner end of the valve chamber 16 is provided with a valve seat 20 and communicates with a passage 21 extending axially through the member 15 as shown in Fig. 2. A valve 22 coöperates with the seat 20 to control the communication between the chamber 16 and passage 21 and is carried by a stem 23 extending lengthwise of the passage 21 and having an outer diameter less than the inner diameter thereof. The stem 23 forms a continuation of a plunger 24 which slidably fits the passage 21 and extends beyond the same as shown in Fig. 2; the plunger 24 at its outer end is preferably provided with an actuating head 25 and not only serves to operate the valve 22 as will be more fully brought out hereinafter but also seals the outer end portion of the passage 21 against any material escape of the air or other gaseous medium. For the purpose of returning the valve 22 to its seat and for maintaining it thereon, a coil spring 26 is provided between said valve and the end of the pipe 17 with its opposite ends in engagement respectively with said valve 22 and said pipe 17 as illustrated in Fig. 2. In order to steady the valve in its movements and to prevent displacement of the spring 26, the valve may be provided with a preferably integral rod 27 which projects from said valve into said spring and extends lengthwise thereof.

A nozzle tube 28 has its one end located in the valve member 15 and secured in position in any suitable manner so as to communicate with the passage 21; this tube 28 extends lengthwise of the pipe section 8 through an axial bore 29 of the plug 13 and has its outer end in axial registry with and in close proximity to the exit nozzle 12 in the operative condition of the device, as shown in Figs. 1, 2, and 3. At its outer end the nozzle tube 28 is preferably provided with a reducing nozzle 28^a having an axial passage 28^b and detachably secured in the tube 28 in any suitable manner as, for instance, by screw threading; in the preferred construction the periphery of the passage 28^b is formed with a spiral channel 28^c which extends throughout substantially the length thereof, as shown in Fig. 5. The reducing nozzle 28^a may be further provided with an annular flange 28^d adapted to engage the end of the tube 28 to arrest the inward movement of said nozzle 28^a relatively to said tube 28. The latter is preferably of an outer diameter capable of slidably fitting within the exit nozzle 12 in engagement with the surface thereof, for the purpose to be more fully brought out hereinafter.

In the preferred construction, the valve member 15 may be provided with a transverse opening through which oil or other lubricant for the valve 22 and its parts may be introduced, said opening being normally closed by means of a screw cap 30 as shown in Fig. 2.

The device may further include a lock nut 31 whereby the cap 10 may be secured against unintentional displacement or maintained in any adjusted position; it will be understood that generally speaking this lock nut 31 will not be required.

In some cases, it may be also desirable to provide the outer end portion 11 of the cap 10 with an internal helical or spiral channel 32 located on the inner surface of said portion 11 and forming substantially a continuation of the helical channel 14 of the plug 13 as shown in Fig. 3.

The device in its operative condition is connected, through the medium of the tubes 7 and 19, respectively, for instance, with a suitable source of paint, lacquer, varnish, oil, or the like, and with a source of air or other gas under pressure; in use the pipes 5 and 17 may be utilized as a handle whereby the exit nozzle 12 is directed to distribute the spray of paint in the desired manner. By depressing the head 25 and plunger 24 against the tension of the spring 26, the valve 22 is moved away from the seat 20 whereby the chamber 16 is thrown into active communication with the passage 21. As soon as this occurs, air or other gas under pressure rushes from the tube 19 and pipe 17 through the chamber 16 and into the passage 21 from which it passes into the nozzle tube 28 and through the passage 28^b of the reducing nozzle 28^a whereby the volume of air leaving the tube 28 is reduced; by substituting reducing nozzles 28^a having passages 28^b of different dimensions, the relation or volume of air to liquid may be varied at will. As the air passes through the passage 28^a, a whirling motion is imparted thereto through the medium of the spiral channel 28^c; after leaving the passage 28^b the whirling air passes out through the nozzle 12 and produces a suction in the cap 10 whereby paint or other material is drawn through the space between the end of the tube 28 and the inner surface of the cap 10 and is carried with the air in a finely comminuted or atomized condition. Owing to the fact that before reaching the nozzle 12 the paint is forced to pass through the helical channel 14 of the plug 13 and also along the helical channel 32 of the end portion 11 of the cap 10 if the same forms part of the structure, it is also given a whirling motion, with the result that the spray which leaves the nozzle 12 is a whirling spray. By imparting a whirling motion to both the paint or other material and the air, the paint or other material is atomized to a maximum degree and in addition is also evenly and finely distributed over an area of much greater extent than if caused to simply pass

out of the nozzle in substantially straight lines. The operation of the device may be discontinued at will by simply removing the pressure from the head 25 whereby the valve 22 is closed under the influence of the spring 26 and the supply of air or other gas is cut off.

The volume of the spray as well as its physical characteristics may be changed by adjusting the cap 10 on the pipe section 8 to vary the space between the end of the tube 28 and the inner surface of the cap end 11; by screwing this end 11 into actual engagement with the end of the tube 28, the flow of paint through the nozzle 12 may be entirely cut off. This is of value in cases where the supply of material is located at a higher level than that at which the device is being used and prevents the paint from unintentionally flowing from the nozzle 12, for instance, after use of the device has been temporarily discontinued. The operation of the spray and its characteristics may further be controlled by proper manipulation of the valve 22 through the medium of the head 25 and plunger 24. Owing to the fact that the outer diameter of the tube 28 slidably fits within the outlet nozzle 12, the tube 28 may be utilized to clean out said nozzle if this is necessary. This may be accomplished by screwing the cap 10 back upon the pipe section 8 so that the outlet nozzle 12 is moved back upon the tube 28, the latter projecting through the nozzle in the final position of the parts. As the above operation takes place, the tube 28 pushes before it any paint, or the like, or in case the device has been used for spraying oil, any carbonized substances which may have accumulated in said nozzle 12; as a matter of fact, the tube 28 may also exert an actual scraping action on the surface of said nozzle 12 so that the latter is easily and efficiently cleaned. The bevel 13^a of the plug 13 permits the necessary movement of the cap 10 upon the pipe section 8 to bring about the above results.

The device is particularly adapted for efficiently covering large surfaces, for instance, in the art of camouflage, in a minimum of time and with a minimum of effort; the form of the device and the relative location of the head 25 with respect to the pipes 5 and 17 makes it comfortable to manipulate thus reducing fatigue consequent to the use of said device to a minimum. The details of construction have been reduced to the simplest form, thus increasing the life of the device and practically obviating the necessity for continuous examination and reducing the necessity for adjustment and repairs to the lowest point. The device, because of its simplicity, needs no skilled attention and is readily maintained in an efficient condition; for instance, in addition to the method described above for cleaning the nozzle 12, the device may further be quickly cleaned when desired by simply passing gasolene, turpentine or other cleansing agents therethrough, this being readily accomplished without difficulty.

My device is particularly adapted for the spraying of paints, lacquers, varnishes and oils of all kinds, including fuel oil and in addition may be used with equal efficiency for spraying other materials such as germicides, disinfectants and insecticides, in powdered and liquid form, pulverized coal, and the like.

In addition to its other functions, the plug 13 serves to steady the tube 28 and to maintain it in its intended axial alinement with the nozzle 12, as will be readily apparent from the drawings.

Various changes in the specific form shown and described may be made within the scope of the claims without departing from the spirit of my invention.

I claim:

1. The combination of a spraying device whereby a mixture comprising a material and a gaseous agent is sprayed, means for imparting an independent whirling motion to the gaseous agent and means independent of said first means for imparting an independent whirling motion to the material prior to its admixture with said gaseous agent.

2. In a spraying device, a tube for conducting a gaseous agent under pressure, a second tube for conducting a material and surrounding said first tube, means whereby said tubes are connected respectively with a source of gaseous agent and with a source of material and a member located in said material tube and surrounding said gaseous agent tube, said member having a helical channel whereby said material is given a whirling motion prior to its exit from the device.

3. In a spraying device, an air tube, a nozzle carried by said tube and provided with an interior helical channel for imparting a whirling motion to the air, a material tube surrounding said air tube, a member in said material tube and surrounding said air tube, said member being provided with an external helical channel for imparting an independent whirling motion to the material and a cap on said material tube and having an interior helical channel whereby a continued whirling movement is imparted to the material after it leaves the helical channel of said member.

4. A spraying device comprising a tube having a main section connected with a source of material and a communicating section extending at an angle to said main section, a cap carried by said communicating section and having a tapering outlet end, a plug projecting from said communicating section into said cap and having a continuous helical

channel on its outer surface, said plug being further provided with an axial bore, a tubular member located adjacent to said tube and provided with a valve chamber, said tubular member being connected with a supply of air or the like under pressure, a nozzle tube extending lengthwise of said communicating section through the bore of said plug into close proximity to the outlet end of said cap and connected with said tubular member and a valve in the latter whereby the air supply to said nozzle tube is controlled.

5. A spraying device comprising a tubular member connected with a source of material to be atomized, a second tubular member connected with a source of air or the like under pressure, a plug in said first member having a helical channel on its outer surface and provided with an axial bore, a nozzle tube connected with said second member and extending through the bore of said plug, a reducing nozzle removably located at the exit end of said nozzle tube, a nozzle cap movably mounted on said first member and adjustable relatively to said nozzle tube, and a valve whereby the supply of air to said nozzle tube is controlled.

6. A spraying device comprising a tubular member connected with a source of material to be atomized, a second tubular member connected with a source of air or the like under pressure, a plug in said first member having a helical channel on its outer surface and provided with an axial bore, a nozzle tube connected with said second member and extending through the bore of said plug, a nozzle cap movably mounted on said first member and adjustable relatively to said nozzle tube, said cap having an internal helical channel forming substantially a continuation of the helical channel of said plug and a valve whereby the supply of air to the nozzle tube is controlled.

7. A spraying device comprising a pair of contiguous and parallel tubular members connected respectively with a source of material and with a supply of air or the like under pressure, a pair of outlet tubes located one within the other and connected with said members, said tubes extending transversely to said members, a plug located within one outlet tube and surrounding the other and provided on its outer surface with a helical channel, a valve located in the air member and controlling the air supply and means located exteriorly of said air member for actuating said valve.

8. A spraying device comprising a pair of contiguous and parallel tubular members connected respectively with a source of material and with a supply of air or the like under pressure, a pair of outlet tubes located one within the other and connected with said members, said tubes extending transversely to said members, a cap movably mounted on the outer outlet tube and having a nozzle outlet adjustable relatively to the other outlet tube, means whereby the material is given a whirling motion before it reaches said nozzle outlet, means whereby the air or the like is given a whirling motion independently of the material and a manually operated valve for controlling the air supply.

9. A spraying device comprising an outer outlet tube for the material, an inner outlet tube for a gaseous agent under pressure, a plug within said outer tube and surrounding said inner tube and provided with a helical channel on its outer surface whereby said material is given a whirling motion and a reducing nozzle located at the exit end of said inner tube and provided with an interior helical channel whereby a whirling motion is imparted to said gaseous agent.

10. A spraying device comprising outer and inner outlet tubes, a cap adjustably mounted on said outer tube and having an outlet nozzle adapted to fit over said inner tube, said cap being arranged to move said nozzle over and into engagement with said inner tube whereby the latter serves to clean said nozzle.

In testimony whereof I have hereunto set my hand.

EDMUND ECKART.