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AIRBRUSH

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Fig. 1.

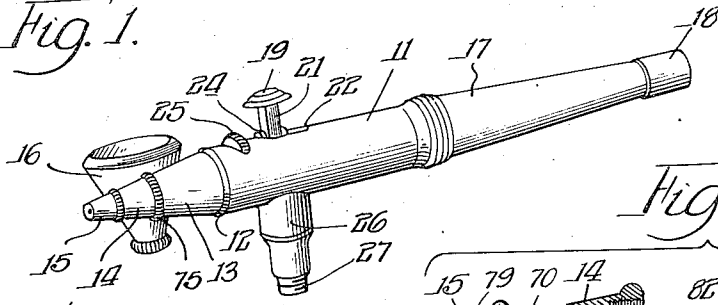


Fig. 3.

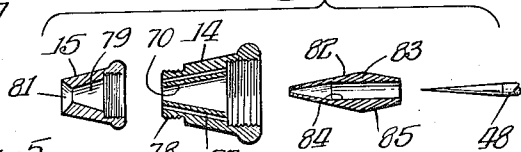


Fig. 2.

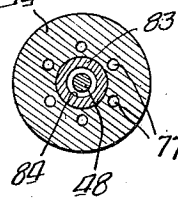
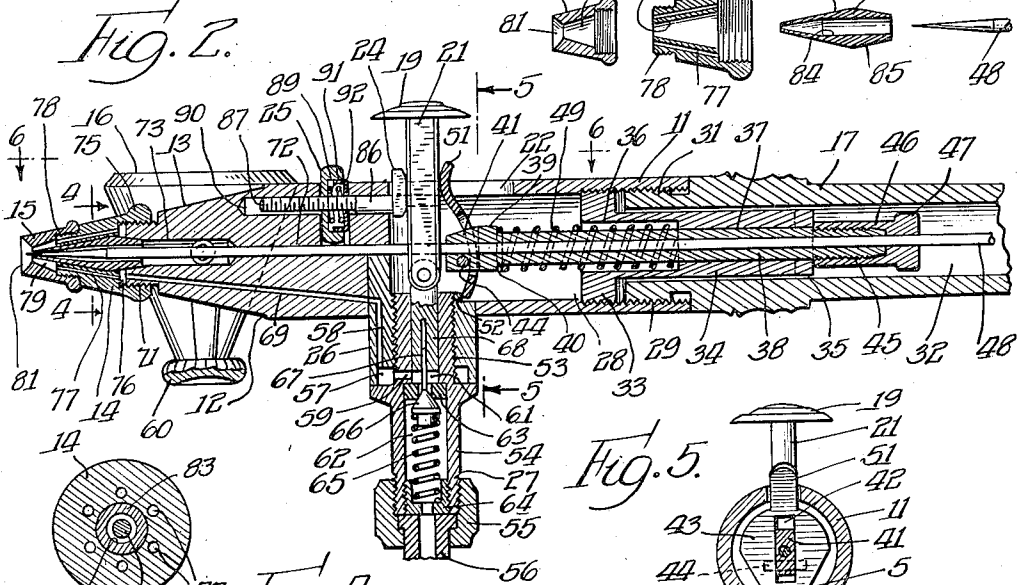


Fig. 4.

Fig. 5.

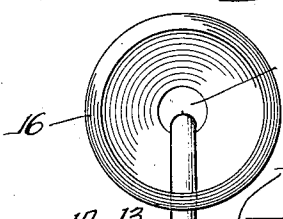
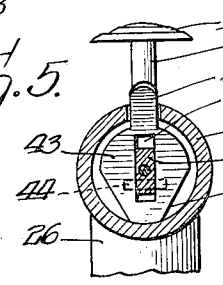


Fig. 6.

Fig. 7.

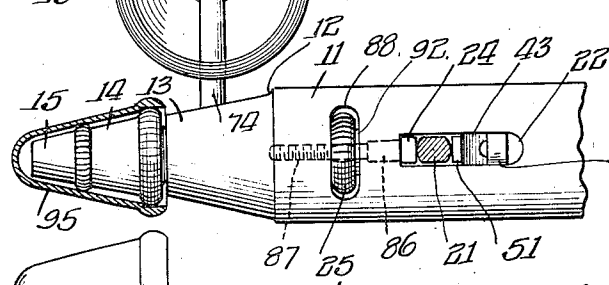
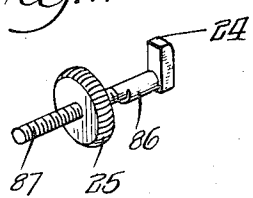


Fig. 8.

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UNITED STATES PATENT OFFICE

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AIRBRUSH

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4 Claims. (Cl. 251-134)

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The present invention relates to improvements in airbrushes and more particularly to an improved airbrush of relatively small size such as is used by artists for fine or delicate work.

In airbrushes of the type used by artists, photographers, designers, illustrators, and others, it has been found desirable to provide an airbrush which could be adjusted, repaired, and cleaned without the necessity of returning the airbrush to the factory. In order to facilitate such servicing of the airbrush by the artist, it has been suggested that certain parts of the airbrush be made removable and replaceable. In such airbrushes one of the parts most commonly requiring attention is the needle and tip which control the supply of liquid or pigment to the brush. It furthermore has been found that the apparatus for controlling the needle valve when released has a tendency to close the needle valve with considerable impact thereby lessening the life of the needle and the needle valve seat. To reduce this hazard it has been suggested to provide an adjustable stop so that the control means might engage the stop to take up any excess shock which did occur as a result of an abrupt release of the control lever. In accordance with the present invention there is provided an improved structure for accomplishing these desired results.

It therefore is an object of the present invention to provide an improved airbrush construction having replaceable parts so arranged that proper positioning thereof is facilitated with the minimum amount of attention on the part of the person making the replacement.

Another object of the present invention is to provide an improved arrangement for micrometrically adjusting the point to which the operating means for the needle valve may move upon a return or closing stroke, thereby positioning the needle in proper position for only sufficient color to produce as fine line as may be required.

Other and further objects of the present invention subsequently will become apparent by reference to the following description taken in connection with the accompanying drawing wherein

Figure 1 is a perspective view of an airbrush incorporating the present invention;

Figure 2 is the longitudinal cross sectional view of the gun shown in Figure 1;

Figure 3 is an exploded view of the parts comprising an improved nozzle or tip arrangement provided in accordance with the present invention;

Figure 4 is a cross sectional view taken across the assembled nozzle or tip as seen in the direction of the arrows along the line 4-4 of Figure 2;

Figure 5 is a cross sectional view in the direction of the arrows along the line 5-5 of Figure 2;

Figure 6 is a top view of a portion of the brush

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shown in Figure 2 as seen in the direction of the arrows along the line 6-6;

Figure 7 is a detailed perspective view of an adjustable stop mechanism provided as a part of the airbrush shown in Figure 2; and

Figure 8 is a view of a protective cap for the nozzle assembly of the airbrush.

Referring to Figure 1 of the drawing there is shown an airbrush including a body member 11 which has a generally cylindrical or elongated configuration preferably tapered in its forward end beginning at a shoulder 12. Adjacent the front end of the tapered portion 13 of the body 11 there is provided a tapered sleeve 14 which in turn supports an air cap 15. A pigment cup 16 is positioned to one side of the tapered portion 13 of the body 11. At the other end of the body 11 there is provided a longitudinally extending handle 17 which preferably also is tapered. As subsequently will become apparent the handle 17 is hollow and a suitable cap 18 is provided to close the opening at the end of the handle 17. At the top side of the body 11 there is located a finger button 19 secured to a finger lever 21 which passes through a suitable opening or slot 22 to the interior of the body 11. The finger lever 21 is pivoted within the body 11 so that it may be moved rearwardly in a slot 22 seen at the top of the body 11. Adjacent the forward or front side of the finger lever 21 there is seen a stop member 24 which is arranged to limit the forward movement of the lever 21 when released and the stop member is adjusted in a position by a knurled operating nut 25. Depending from an intermediate point of the body 11 there is a generally cylindrical member 26 which terminates in a threaded portion 27 for connection by a coupling means to a hose or conduit which is connected to an aeriform substance under pressure. The cylindrical body 26 as subsequently will become apparent houses a valve mechanism for controlling the flow of the aeriform substance.

Referring more particularly to Figure 2 certain details of the structure of the gun shown in Figure 1 now will become apparent. The rear portion of the body 11 is bored out to form a cylindrical cavity 28 so as to provide space for the housing of certain elements. Toward the rear of the cavity 28 the body 11 is provided with a threaded portion 29 to receive a threaded end 31 of the hollow handle 17. The hollow handle 17 is provided with a cylindrical bore 32 so that space is provided for the reciprocal movement of certain elements mounted within the cylindrical bore 28 of the body 11. A cylindrical block 33 engages the threaded portion 28 of the bore 29 of the body 11. The cylindrical block 33 extends rearwardly in reduced size so as to form a cylindrical member 34 having adjacent its rearmost end a knurled portion 35 so that the member 33 may be secured in position by the fingers when

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 the handle 17 has been removed from the body 11 of the airbrush. The block 33 and the longitudinally extending cylindrical portion 34 are provided with two coaxial bores of different diameters, a larger bore 36 extending a certain distance from the front of the block 33 and a smaller bore 37 extending to the rear of the member 34. Mounted within a smaller bore 37 is a generally cylindrical hollow member 38 having its forward end an enlarged portion 39 forming a shoulder 40 with the cylindrical portion 38. Immediately forward of the enlarged portion 39 there is a portion 41 which has a rectangular cross section so as to fit into a rectangular slot 42 formed in a stamped metal operating plate 43. The stamped metal operating plate 43 is secured on the portion 41 by a pin 44. The rear end of the hollow cylindrical member 38 is provided with a bifurcated threaded portion 45 which is arranged to be engaged by a generally cylindrical threaded clamping nut member 46 having a knurled operating knob portion 47. The bifurcated threaded portion 45 when operated on by the cylindrical nut portion 46 reduces the central opening through that portion of the member 38 so as to clamp into position a needle 48. A spring 49 surrounds the outer forward cylindrical portion of the member 38. The spring 49 engages the shoulder 40 at one end and at the other end engages the bottom of the recess 36 in the block 33 so as to urge forwardly the cylindrical member 38 which carries forwardly the needle 48 and the stamped operating plate 43. The upper end of the operating plate 43 is provided with a curved finger 51 which engages the back side of the finger lever 21. The lower portion of the plate 43 engages a shoulder 52 formed by an upwardly projecting portion of the member 26.

The cylindrical member 26 is suitably secured to the body 11 of the airbrush, preferably by sweating since the diameter of the cylindrical member 26 is substantially equal to a cylindrical bored out portion provided adjacent the bottom side of the body 11. The member 26 is provided with a central bore 53 which is threaded so as to receive the threaded stud end of the adjacent member 54, the lower end of which is provided with the threaded portion 27 for engagement with a coupling ring or union joint 55 of a suitable air hose or conduit 56. Immediately adjacent the lower end of the cylindrical member 26 there is provided a bore of increased size so as to provide an annular passage 57 when the shoulder portion of the adjacent member 54 is securely screwed upwardly into position. The annular passage 57 is in communication with a transversely extending aeriform passage 59 in the member 54. The transverse aeriform passage 59 communicates with a central bore 61 in the upper threaded portion 53 of the member 54. The lower portion of the member 54 is provided with a central bore of larger diameter 62 thereby to provide a shoulder portion against which is positioned a valve seat member 63. The lower extremity of the bore 62 is threaded so as to receive an apertured threaded stop member 64 which may be recessed so as to receive one end of a compression spring 65, the other end of which engages a valve head 66 which cooperates with the valve seat 63. The valve head 66 is connected to a valve stem 67 which extends upwardly into an aperture in a cylindrical member 68 which is secured to the lower end of the finger lever 29 which is suitably bifurcated so as to be attached thereto by a member such as a rivet. The finger button 19 when

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 pushed downwardly will cause the lower cylindrical member 28 to move the valve head 66 away from the valve seat 63 thereby to permit an aeriform substance from the hose or passage 56 to enter the cylindrical bore or passage 62, to pass through the valve opening in the seat 63 into the bore 61 which is in communication with the passage 56 which in turn is in communication with the annular bore 57. The aeriform substance thereupon enters the passage 58 which in turn is in communication with one or more generally longitudinally extending passages in the forward portion of the body 11.

The forward portion of the body 11 is provided with one or more longitudinally extending aeriform passages 69 which extend to the foremost extremity of the body 11 which terminates in a threaded portion 71 which is adapted to be engaged by the cooperating internally threaded portion of the sleeve 14. The body 11 is also provided with a central bore 72 in which the forward portion of the needle 48 may move. Adjacent the forward end of the body 11 a central bore 73 is joined by a bore of increased diameter 73 which is arranged for communication with a transverse passage connected to a tube 74 which extends into the fluid or pigment cup 16. The tube 74 extends downwardly to a point closely adjacent the bottom of the cup 16 so as to provide a siphon action to supply fluid or pigment to the bore 73 when the airbrush is in operation. In order that the cup 73 may be readily cleaned the bottom thereof is provided with a threaded cap 60 which may be removed.

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 In accordance with one feature of the present invention the forward end of the airbrush is provided with a sleeve 14 which may have a knurled portion 75 whereby the sleeve may be readily grasped with the fingers for removing and replacing the sleeve. Adjacent the knurled portion 75 the inside of the sleeve 14 is provided with a threaded portion for engaging the forward end 71 of the body 11. This engagement of the threaded portion of the sleeve 14 with the threaded forward end of the body 11 is so arranged that when the sleeve 14 is in position a small annular space is left to provide an annular passage 76. The sleeve 14 between its inner and outer surfaces is provided with a plurality of longitudinally extending passages 77 which may be positioned at equal angular displacements, as is apparent from the cross sectional view shown in Figure 4. The forward end of the sleeve 14 is provided with a threaded portion 78 for receiving the internally threaded portion of the air cap 15. The air cap 15 is provided with a conical internal bore 79 which joins with the concave portion 81 which preferably is a frusto-conical surface although it may also be of some other configuration such as a slightly concave surface. It will be seen from the drawing that the forward end of the needle 48 projects into the forward cavity 81 of the air tip 15.

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 The inner surface 70 of the sleeve 14 is a frustum of a cone which is complementary to the forward frusto-conical surface 82 of a needle valve seat or tip 83. The outer configuration of the self centering needle valve tip 83 is composed of two coaxial frusto-conical sections, and the inner bore 84 terminates in a frusto-conical surface complementary to the conical surface at the forward end of the needle 48. The rear frusto-conical surface 85 of the member 83 is arranged to engage a complementary frusto-conical surface 75 at the end of the member 11 adjacent the bore

73. The sleeve 14 therefore together with the cooperating frusto-conical surface adjacent the end of the body 11 operates to engage the outer frusto-conical surface of the self centering tip 85 so as to properly position this tip with respect to the body 11 and the needle 48. The self centering tip 83 generally is formed of a metal somewhat harder than the metal from which the body 11 is made, as the body quite commonly is made of brass. The needle 48 quite obviously is formed of steel.

In order that the needle 48 will not engage the inner surface of the centering tip 83 with such force as to produce undue wear or deformation of the inner surface of the tip 83 or the outer surface of the forward end of the needle 48, there is provided a micrometrically adjustable stop 24 which is arranged at right angles to a longitudinally extending member 86 the rearward portion 87 of which is provided with suitable threads for engagement by the knurled adjusting nut 25. The adjusting nut 25 is positioned in a slotted opening 88 as may be seen from Figure 6. In order that the position of the knurled nut 25 be maintained fixed during the operation of the gun so as to not disturb the micrometric adjustment of the stop member 24, the inside of the nut 25 is bored out so as to provide a cavity 89 within which is positioned a coil spring 91 and a cup shaped member 92. The spring 91 therefore engages the inside surface of the cavity 89 in the knurled member 25 and the inside surface of the cup shaped member 92 thereby to urge these members away from each other and into an engagement with the walls of the slot 88 formed in the body member 11. The body member 11 of course is provided with a suitable longitudinally extending passage 90 in which is positioned the longitudinally extending member 86 having a threaded terminal 87.

In operation the operator of the airbrush applies finger pressure to the finger cap 19 so as to move the finger lever 21 downwardly thereby to admit air to the nozzle and rearwardly moves the lever 21 so as to cause the member 38 which grips the needle 48 to move the needle rearwardly away from the centering tip 85 so as to permit fluid from the passage 73 to surround the forward end of the needle 48 and to pass through the opening at the end of the centering tip 83, which end projects slightly into the forward cavity 81 of the air tip 15.

A fluid or pigment cup 16 has an inverted frusto-conical shape provided with a threaded cap 60 which preferably has a concave bottom surface so that when the cup 16 and the attached conduit 74 are removed from the body 11 of the airbrush, the cup 16 may be placed on the surface of a table. By having the underside of the knurled nut or cap portion 60 concave, the cup will be supported in a relatively stable manner.

In order to protect the air tip or nozzle assembly there may be provided a readily removable cap 95 such as shown in Figures 8 and 6. This cap therefore will protect the nozzle assembly from dust and dirt during periods of nonuse.

While I have shown and described a particular embodiment of the invention, it is to be understood that I do not wish to be limited thereto since obviously such variations may be made that are commensurate with the scope of the appended claims.

The invention is hereby claimed as follows:

1. An airbrush of the type described comprising an elongated body having a passage for a

needle, a needle mounted in said passage for longitudinal movement therein, spring means biasing said needle in one direction, a pivoted finger operated lever for moving said needle in opposition to said spring, and means for micro-metrically predetermining the limit of movement of said needle by said spring, said means comprising a transverse slot formed in said body in the proximity of said lever, a longitudinal passage intersected by said slot, a threaded member mounted in said longitudinal passage and adapted to engage at one end said lever, a cup shaped nut mounted in said slot and on said threaded member, a cup shaped member mounted within said nut to form a closed chamber and a spring housed within said chamber to urge said latter cup and said nut into frictional engagement with the walls of said slot thereby to retain said nut and said threaded member in an adjusted position.

2. In a device of the character described, a body member formed with a passage for a needle valve, a spring for biasing the valve to seated position, a pivoted finger operated lever for moving the valve to open position against the action of the spring, a threaded stop positioned within said body member for longitudinal movement therein having a portion adapted to engage the pivoted lever to limit its motion in one direction, a transverse slot formed in said body member and a nut positioned in said slot in threaded engagement with said stop for adjusting its longitudinal position.

3. A device as in claim 2 including in combination means for frictionally holding the nut in adjusted position.

4. An airbrush of the type described comprising an elongated body having a passage for a valve needle, a valve needle mounted in said passage for longitudinal movement therein, spring means urging said valve needle in one direction, a pivoted finger operated lever for moving said valve needle in opposition to said spring, and means for micro-metrically pre-determining the limit of movement of said valve needle by said spring, said means comprising a transverse slot formed in said body in the proximity of said lever, a longitudinal passage intercepted by said slot, a threaded member mounted in said longitudinal passage and adapted to engage at one end said lever, and a nut mounted in said slot, said nut being rotatably mounted on said threaded member.

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