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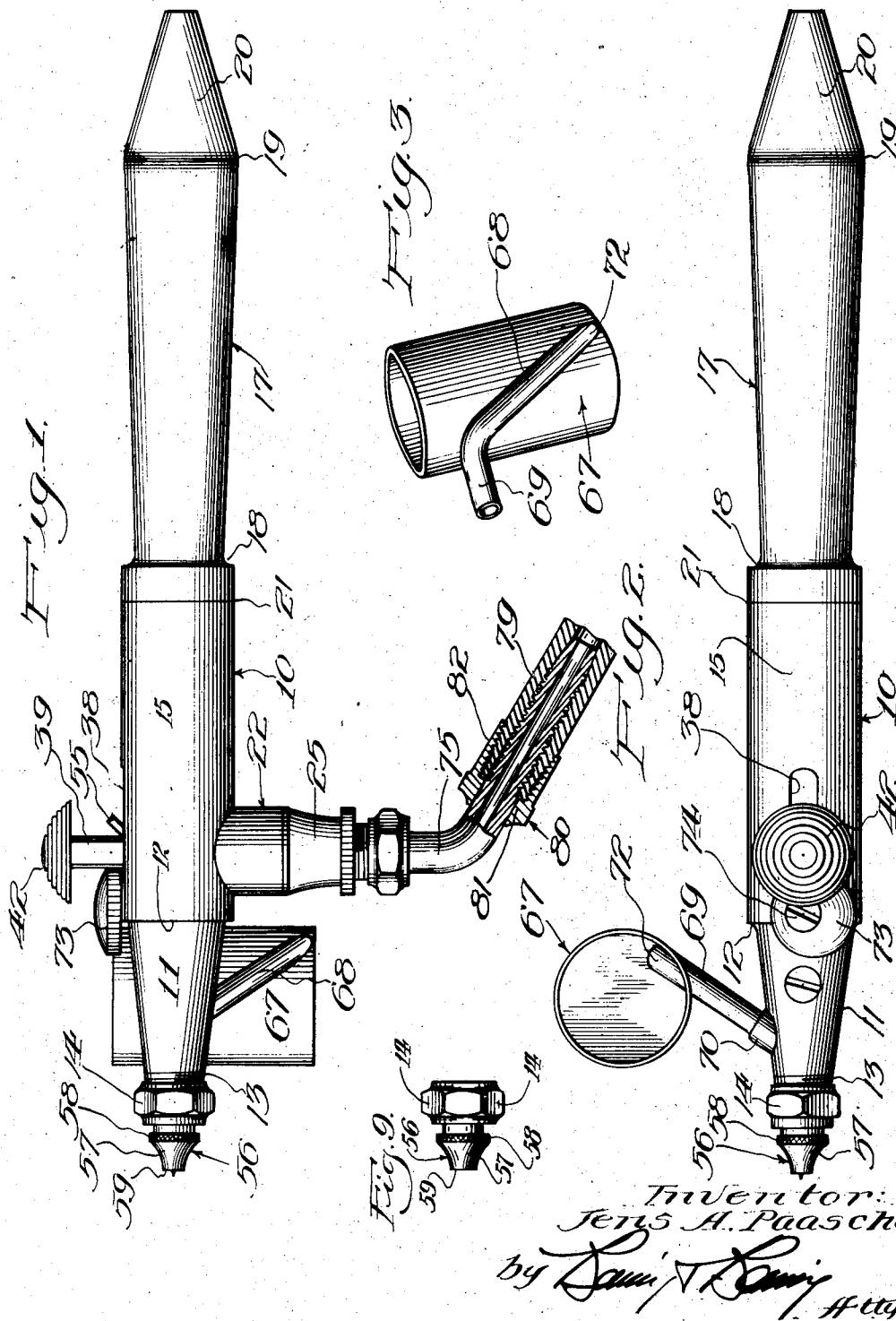
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2 Sheets-Sheet 1



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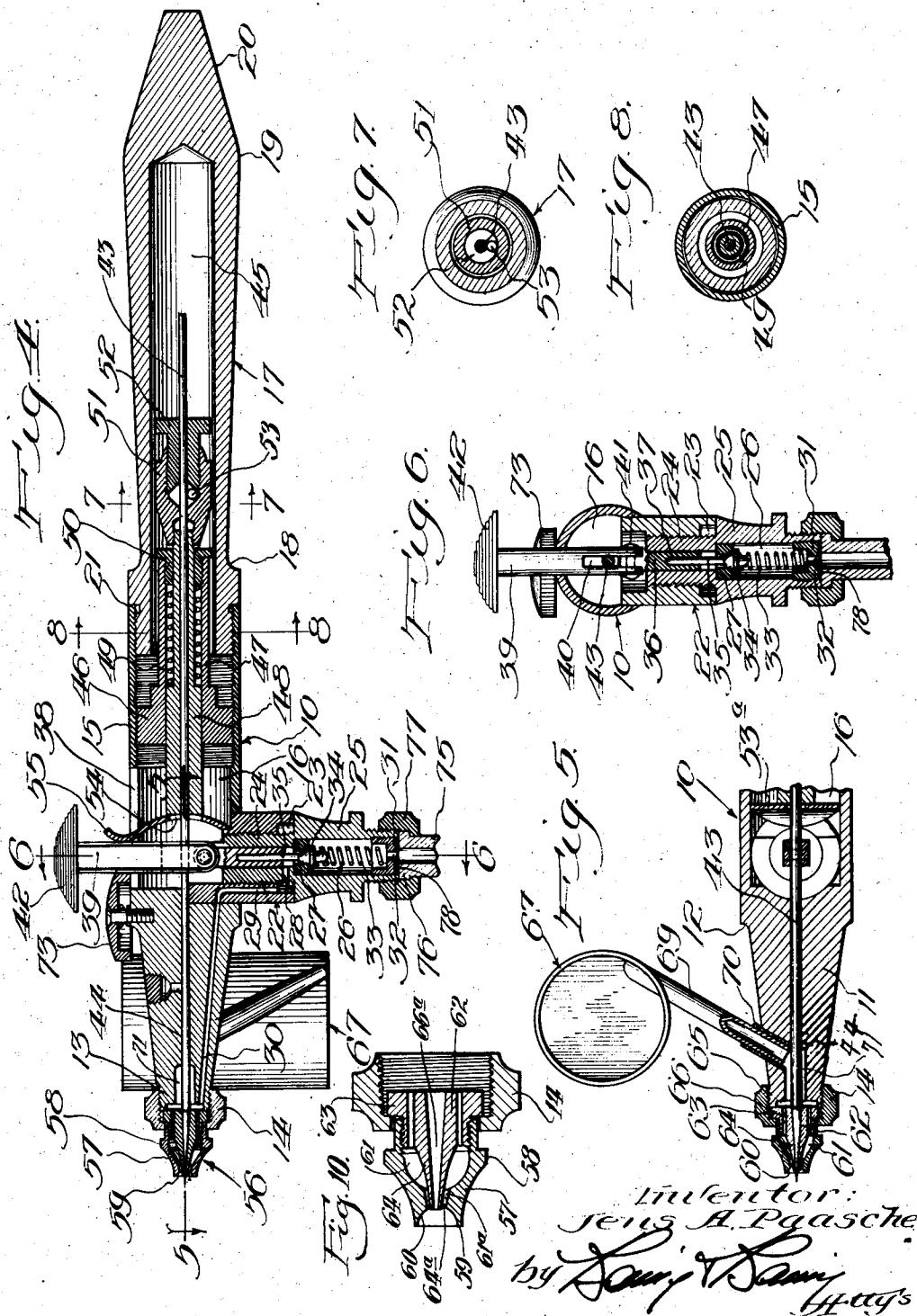
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UNITED STATES PATENT OFFICE.

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AIR BRUSH AND THE LIKE

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This invention has to do particularly with improvements in air brushes of relatively small size, such as are used by artists, photographers, designers, illustrators, and others for fine, and, in some cases, very delicate work. One of the features of the present invention is the provision of a multiple head air brush of such arrangement that a separate head, consisting of tip, air cap and lock nut, can be very easily removed and replaced and adjusted by the user so as to make it possible to substitute a new or different form of head or tip immediately and without the necessity of sending the entire air brush to the shop for such work.

In the past, it has been found necessary to send the entire air brush to the shop when the tip is to be repaired or replaced. This has not only resulted in temporary interference with the use of the apparatus itself, but, in many cases, has made it necessary for the operator to lose a large amount of his time and interrupt his work accordingly. Otherwise, to carry a double amount of complete equipment in his studio.

One of the objects of the invention is to provide a multiple head air brush, so that the tip or nozzle portion can be easily removed and adjusted or replaced by the user himself with certainty that he will be able to bring the parts into exact adjustment, so that they will function perfectly.

In this connection it is a further object to provide a tip or head portion of such construction that it can be "floated" into position to bring the orifice into exact alignment with the needle, and can then be locked solidly into place by the lock nut. This will enable the user himself to set the tip into place and make the desired adjustment or substitution or replacement without the need of calling in the services of an expert mechanic or repairman, and with definite assurance that the tip will be brought into absolutely perfect alignment with the needle. The importance of such perfect alignment is well understood by those skilled in the art, and is due largely to the need of creating an annular orifice of absolutely uniform size all around the needle and no matter what the amount of needle opening may be.

Another feature of the invention relates to the provision of a construction such that a very delicate action of the air valve and needle valve may be secured, thus enabling the operator to greatly improve the quality and accuracy of this work.

In connection with the foregoing, it is a further object to provide an improved operating means for the air valve and for the needle, which means is so constructed that a very delicate and accurate response may be secured in every operation when holding the brush in the most natural convenient position.

A further feature of the invention relates to the provision of means for immediately adjusting the normal or back stroke position of the needle, so that when the button is fully released, said needle will just return to the closed position without jamming. This will also make it possible to improve the accuracy and certainty of the adjustment when the user substitutes a new nipple in his studio.

Another feature of the invention relates to the provision of an improved means for attaching the air line to the brush, so that the air hose connection will be made in the most convenient manner consistent with satisfactory operation, and at the same time with the least amount of interference with the convenient manipulation of the brush. In this connection, it is a further object to bring the air line directly to the position of the air valve which in turn is located within an extension so placed as to constitute a portion of the handle of the brush which is readily supported by pressure against the thumb.

Another feature relates to the provision of an improved form of locking device for locking the needle to the operating sleeve. This improved locking device includes a ball lock manipulated by a sleeve.

Other objects and uses of the invention will appear from a detailed description of the same, which consists in the features of construction and combinations of parts herein-after described and claimed.

In the drawings:

Figure 1 shows a side elevation of the air brush embodying the features of the present

invention, the pigment cup being turned with its axis at right angles to the axis of the brush handle;

Fig. 2 shows a plan view corresponding to Fig. 1;

Fig. 3 shows a perspective view of the pigment cup itself;

Fig. 4 shows a longitudinal section corresponding to Fig. 1;

Fig. 5 shows a fragmentary horizontal section on the line 5—5 of Fig. 4, looking in the direction of the arrows;

Fig. 6 shows a vertical section on the line 6—6 of Figs. 4, looking in the direction of the arrows;

Fig. 7 shows a cross section on the line 7—7 of Fig. 4, looking in the direction of the arrows;

Fig. 8 shows a cross section on the line 8—8 of Fig. 4, looking in the direction of the arrows;

Fig. 9 shows a side view of a removable tip portion similar to that shown in Fig. 1, but removed from the rest of the device; and

Fig. 10 shows a detail longitudinal section through the tip, on enlarged scale.

The body of the air brush includes a cylindrical member 10 the front portion 11 of which is preferably tapered commencing at the position of a shoulder 12 and having its front end 13 externally threaded to receive a union nut 14. The rear portion 15 of this body member 10 is bored out to establish a longitudinally extending bore 16 which reaches inwardly from the rear end, as clearly shown in Fig. 4. Into said rear end is threaded the front end of a fiber or composition handle 17, which together with the body member 10, constitutes the handle. Said fiber member 17 is preferably circular as is the body member 10, and is provided with a rearwardly facing shoulder 18 at a position slightly behind the rear end of the member 10. Commencing at said shoulder 18 the handle 17 tapers easily in size to a point 19 where its diameter is restored substantially to the full size of the member 10. The extreme rear end 20 is then tapered off, as clearly indicated. The member 17 is also preferably shouldered at the point 21 where it comes into registry with the member 10 so as to establish a continuity of surface at this point.

Reaching downwardly from the member 10 at approximately the position of the front end of the bore 16 and slightly behind the shoulder 12 is a block 22 which is preferably circular and of slightly smaller diameter than the member 10. This block is hollowed out to establish a vertical bore, the lower portion 23 of which is of increased size, as indicated in Fig. 4. Into this bore there is threaded the nipple 24 which reaches upward from a block 25, so that upon threading said nipple into place, the block 25 is securely drawn against the lower end of the member 22 so

as to enclose the enlarged bore 23 and establish an annular passage. The block 25 is also provided with a longitudinal passage 26, the upper portion whereof is of reduced size, so as to establish a shoulder, and an annular valve seat 27 is placed at the position of said shoulder. A port 28 reaches sidewise from the bore above the position of the valve seat 27 so as to communicate with the annular passage 23. Another passage 29 reaches up through the block 22 and then sidewise to communicate with an air passage 30 reaching forwardly through the front portion 11 of the body member 10.

A nut 31 is threaded into the lower end of the bore 26, said nut being provided with a central opening 32, and serving as a lower abutment for a spring 33 within the passage 26. The upper end of this spring works against a cone valve 34 on the lower end of a stem 35, said stem in turn being supported by a plunger stem 36 which works in the upper portion 37 of the passage 26, already referred to. This upper portion is straight, as indicated in Figs. 4 and 6, and the plunger stem 36 works easily therein, but in substantially air tight fashion. Consequently, during the time that air is being delivered through said valve, it will be compelled to flow directly to the passages 29 and 30.

There is a slotted opening 38 in the upper portion of the body member 10 at the position above the block 22. A finger lever stem 39 works freely through this opening, the lower end thereof preferably being bifurcated, as shown at 40, and the lower end of said bifurcated portion being pivoted to the plunger stem 36, as shown at 41. A finger button 42 is placed on the upper end of the lever stem 39, so that by moving said finger button back and forth, said lever stem will be rocked on its pivotal mounting, whereas by depressing the finger button the air valve will be opened. In the usual operation, the finger button is first depressed to open the air valve, and then the finger button is swung back and forth to control the pigment.

The pigment control is effected through the medium of a needle 43 which extends longitudinally through the air brush. The front portion of this needle reaches through a bore 44 in the front body portion 11. The needle then passes through the bifurcated opening 40 of the swinging arm 39, and then to the rear. The body extension 17 is bored out, as indicated at 45, to accommodate the needle and for other purposes.

A block 46 is threaded forward into the rear portion of the bore 16 of the body 10, said block 46 having a rearwardly extending neck 47. Within this block is slidably mounted a needle block 48, the front end of which comes to a position fairly close to the swinging arm 39, the rear portion of said needle block 48 being of reduced size to accommodate a spring

49 between it and the rearwardly extending neck 47. A nipple 50 is threaded into the rear end of said neck 47 and serves as a fixed abutment for the spring 49. The spring thus tends to drive the needle block 48 forwards. By adjustment of the nut 50 a lighter or stronger action is accomplished.

The extreme rear end of the needle block 48 carries a needle chuck body 51 which is threaded thereon. Said chuck body receives into its rear end a clamping nut 52, the front portion of which is tapered to receive a ball 53 for locking the needle firmly. For this purpose, the chuck body 51 and the nut 52 are provided with opposing concave tapered surfaces, so that when the nut 52 is tightened the ball 53 is clamped against the needle to lock the same in position. By loosening the block nut 52, the needle is released, so that it can be set backwardly or forwardly as necessary for adjustment. It may then be again clamped solidly to the chuck body 51. The result of the foregoing is that the spring 49 tends to drive the needle forwards with respect to the body of the device.

Working easily within the bore 16 of the body member 10 there is an operating plate 53^a, preferably in the form of a sheet metal stamping. The lower portion of this plate bears against the upper milled end of the block 22, which, for this purpose, is preferably shouldered, as shown in Fig. 4. The plate 53^a is curved forwardly and upwardly, having a central opening 54 for the free accommodation of the needle without binding, and preferably the extreme upper end of the plate 53 is curved, as shown at 55, to receive pressure from the swinging arm 39. Upon drawing the finger button 42 rearwards, the needle is drawn back to control the pigment.

The head 56 is removably and adjustably secured to the front end 13 by the union nut 14, already referred to. This head preferably comprises a small conical air cap member 57 having an outstanding knurled flange 58. The air cap member 57 tapers forwardly from said flange to its extreme front end 59, said front end in turn being dished out, as shown in Fig. 10, on a fairly sharp angle 60. The interior of the member 57 is hollowed out, as shown at 61, and a central passage 61^a reaches between the dished out portion 60 and said hollowed out portion 61. A block 62 having a rear flange 63 is threaded into the hollowed out portion 61 so as to close the rear end thereof, but leaving a chamber between the two parts. A central nipple 64 reaches forward from the block 62, said nipple tapering in size and reaching through the central opening 61^a aforesaid and terminating within the dished out opening 60 of the air cap member 57, but leaving a fine annular passage 64^a around the tip of said nipple. Consequently, air delivered into the annular space 61 will pass out through this fine annular passage 64^a and into

the dished out opening 60 immediately in advance of the front end of the nipple 64. Preferably the opening 61^a is formed in a taper of about 12° from the axis, while the tip portion of the nipple 64 is formed on an angle of about 8° from the axis, so that the annular passage 64^a tapers in the discharge direction.

When the air cap 57 and the tip 62 are assembled, the flange of the union nut is first set between the parts, so that after they have been assembled the union nut may take against the flange 63 of the tip 62. Upon threading the union nut onto the front end 13 of the body member 10, the tip unit will be drawn solidly into place as evident from Fig. 5.

Examination of Fig. 10 shows a clearance between the flange 63 and the inside of the union nut, and also a clearance between the front flange of the union nut and the rear portion of the air cap 57. Consequently, after the union nut has been threaded onto the front end 13 of the air brush, the tip unit can shift laterally into aligned position before the union nut is finally definitely tightened up. The amount of such shift is made sufficient to ensure proper alignment of the tip unit with the needle. In this way, the tip unit is allowed to float into aligned position, and assurance is had that when the union nut is tightened up, the tip will be perfectly aligned with the needle.

In the front face of the front end 13 there is an annular groove 65 which communicates with the air passage 30, already referred to, air being thus delivered into said groove. There are three fine passages 66 reaching through the tip 62 and delivering air from the groove 65 into the space 61, already referred to. In this way, the air reaches the tip from the air valve.

The front end of the needle 43 is delicately tapered and works nicely within a tapered passage 66^a of the tip 62. Normally, the needle projects slightly beyond the front end of the tip when the needle is fully seated in the manner indicated in Figs. 4 and 5. Upon drawing the needle backward in its normal operation, it works with its front end slightly in advance of the front end of the tip.

The pigment cup is designated in its entirety by the numeral 67. Reaching up along one side thereof is a section of tubing 68, the upper end 69 of which is turned over and reaches away from the cup proper in a plane line substantially at right angles to the axis of the cup. Said upper end 69 then lies also in a plane which is tangential to the cylinder of the cup, as clearly evident from Figs. 2 and 5. The extreme end of said portion 69 is tapered slightly, so that it may be set snugly into a nipple 70 which reaches sidewise from the front portion 11 of the body 10 at an angle of perhaps 30° back-

wardly from right angles, as indicated in Figs. 2 and 5. This nipple 70 has a passage reaching into a passage 71 which surrounds the needle 43 and is of larger size than the
5 needle. The angle at which the cap is attached to the brush, and the angle of the cup stem facilitate much freer flow of color than in the old 90° constructions, and also make cleaning much easier.

10 When the air valve is first opened by depressing button 42, suction is created around the front end of the needle and in advance of the nipple 64. Upon drawing back the needle, this suction communicates back into
15 the passage 71 and thence into the tube leading into the lower portion of the pigment cup so as to draw pigment therefrom. In this connection, it will be noted that the lower end 72 of the tube 68 terminates just
20 above the floor of the pigment cup so as to allow free entry of pigment thereinto.

Owing to the peculiar direction in which the tube 68 is connected into the pigment cup, and to the direction in which the upper
25 end 69 is laid into the body member, when the body member is so turned as to allow the hand to grasp the brush in the normal manner, the pigment cup itself will stand in a practically upright position. This position
30 may be modified by simply turning the pigment cup with respect to the nipple 70, but in each modified position it will be found that a normal and natural relationship results.

I wish to emphasize the fact that the head
35 herein disclosed, which is furnished with large or fine openings, is a completely self contained member which can be very quickly attached to or removed from the front end of the body 10 by simply manipulating the
40 union nut 14. By standardizing the parts it is possible to set a new tip into place practically without the necessity of adjusting the needle valve at all. In order, however, to allow for adjustment of the forward movement of the needle, I have provided an eccentric block 73 which is placed on the upper
45 portion of the body member 10, being held in place by a screw 74 which is passed through the eccentric block 73 off center or eccentrically. This block 73 stands in place to limit
50 the forward movement of the swinging arm 39 which in turn controls the forward advance of the needle. All that is required is that the needle shall come to a closing position admitting only enough color to produce
55 a fine hair line when the finger button 42 is fully released; and in case the user finds that a new tip, which may have been substituted, does not operate with the correct needle adjustment he may correct the adjustment by
60 turning the block 73 slightly in one direction or the other and then relocking it.

The air hose is preferably connected to a swivel nipple 75, the upper end of said nipple having a flange 76 which may be en-

gaged by a union nut 77 in order to lock the nipple to the lower end of the block 25. This nipple 75 preferably curves upwardly, as shown in Fig. 1, so that the air hose will be brought to the air brush at a convenient
70 angle. If desired, a small screen 78 may be placed between the upper end of the nipple 75 and the block 31, as clearly shown in Fig. 4.

The hose 79 is connected to the nipple 75 by tapering and threading said nipple to receive the hose. A nut 80 has a flange 81
75 closely engaging the nipple and a collar 82, interiorly threaded on a taper, to receive the end portion of the hose. By tightening up said nut, as shown in Fig. 1, the end portion
80 of the hose will be firmly clamped against the nipple.

While I have herein shown and described only a single embodiment of the features of my present invention, still I do not intend
85 to limit myself to the same, except as I may do so in the claims.

I claim:

1. An air brush for the purpose specified comprising in combination a cylindrical body
90 member terminating in an externally threaded end and having a central longitudinally extending needle passage, and also having a circular forwardly facing groove in its front end surrounding said needle passage, there
95 being an air passage communicating with said groove, a needle slidably mounted within the needle passage and having its front end tapered in size, and a tip unit removably
100 mounted on the front end of the device, said tip unit including a cylindrical block having an annular flange on its rear end of proper size to seat against the front end of the body member aforesaid to thereby enclose the forwardly facing groove thereof, the central portion
105 of said block being of reduced size and externally threaded, the forward portion of said block being tapered to establish a central forwardly reaching nipple, said block being provided with a through passage aligning
110 with the needle passage of the body member and tapering in size to receive the front tapered end of the needle in sealing fashion when the needle is fully advanced, said tip unit also including a conical member surrounding the central nipple aforesaid and spaced therefrom to establish an annular chamber therewith and also having a backwardly reaching internally threaded flange
115 threaded onto the body portion of the cylindrical block to lock the parts together, said conical member tapering in size towards its front end and terminating in a central forwardly facing concave discharge face surrounding the extreme end of the central nipple, there being a fine annular opening reaching between the annular chamber and the concave discharge face, there being a longitudinal passage reaching through the cylindrical block to establish connection between
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the annular chamber of the tip unit and the forwardly facing groove of the cylindrical body member, and a union nut surrounding the rear portion of the cylindrical block and having a front flange engaging the annular flange of the cylindrical block to clamp the same against the front face of the body member, the front flange of the union nut having a central opening larger than the cylindrical block to permit centering and aligning of the parts, substantially as described.

2. An air brush for the purpose specified comprising in combination a cylindrical body member having its front end tapered and provided with a downwardly depending lug portion immediately behind the position of the taper thereof, a tip removably mounted on the front end of said tapered portion and including a central longitudinal needle opening together with a surrounding annular air opening, a swinging arm pivotally mounted with respect to the body of the device to swing about a horizontal transverse axis at a position in line with the downward projection aforesaid, a finger button on the upper end of said arms, an air valve and needle connection under control of said swinging arm, a cylindrical pigment pot located at one side of the tapered forward end portion aforesaid, a pigment tube lying tangentially against the cylindrical pigment pot and extending upwardly from the lower portion of said pot and at an angle with respect to the axis of the pot and lying within a plane parallel to the axis of the pot, a terminal portion on the upper end of said tube extending at right angles to the general axis of the pot and lying in a plane tangent to the cylinder of the pot, and a socket in one side of the front portion of the body of the air brush facing outwardly and rearwardly at an angle to the axis of the air brush, whereby the position of the pigment pot may be adjusted correctly for all positions by turning the pigment pot with respect to said socket, substantially as described.

3. An air brush for the purpose specified comprising in combination a cylindrical body member, a tip removably mounted on the front end of said body member and including a central longitudinal needle opening together with a surrounding annular air opening, a swinging arm pivotally mounted with respect to the body of the device to swing about a horizontal transverse axis, a finger button on the upper end of said arm, an air valve and needle connection under control of said swinging arm, a cylindrical pigment pot located at one side of the tapered forward end portion aforesaid, a pigment tube extending upwardly from the lower portion of said pot and at an angle with respect to the axis of

the pot and lying within a plane parallel to the axis of the pot, a terminal portion on the upper end of said tube extending at right angles to the general axis of the pot and lying within a plane tangent to the cylinder of the pot, and a socket in one side of the front portion of the body of the air brush facing outwardly and rearwardly at an angle to the axis of the air brush, whereby the position of the pigment pot may be adjusted correctly for all positions by turning the pigment pot with respect to said socket, substantially as described.

4. In an air brush, the combination with a body member having a front air delivery passage, together with a forwardly projecting central tapered needle for control of a liquid to be sprayed, of a tip unit for said device including a central block having an outwardly projecting rear flange, there being a central needle passage in said block for the accommodation of the front portion of the liquid volume control needle aforesaid, and there being an annular air passage in said tip unit surrounding the central passage aforesaid, and a union nut having at its front end an inwardly reaching flange element adapted to engage the front face of the outwardly projecting flange of the block aforesaid, the inwardly reaching flange element of the union nut and the outwardly projecting flange element of the tip unit block aforesaid overlapping and the central opening of the union nut flange being of larger size than the body of the tip unit block and the body portion of the union nut being of larger size than the tip unit block flange to thereby permit lateral adjustments between the union nut and the block aforesaid while maintaining engagement between the flanges, and suitable co-operating threads on the union nut and the front portion of the body block, substantially as described.

5. In an air brush, the combination with a body block having suitable passages for air and liquid, a longitudinally extending needle slidably mounted within said device, a sleeve surrounding the needle, means for shifting the sleeve back and forth within the body block, and means for securing the sleeve to the needle, said securing means including a chamber on the rear end of the sleeve and surrounding the needle, a ball within said chamber and against the needle, and a clamping nut surrounding the needle and closing the rear end of the chamber, the face of the chamber and the end of said nut being provided with opposing faces establishing a conical space for the accommodation of the ball and of smaller width in its outer portion than in its inner portion for the purpose specified.

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