This invention relates to improvements in devices for spraying paints, lacquers and other liquids and is an improvement upon devices such as disclosed in my Patent Number 1,706,575 issued March 26, 1936.

In paint spray guns, generally in use, the paint is discharged through a nozzle and broken up and atomized by means of air under pressure. The dimensions of the spray remain substantially constant unless another form of nozzle is used or substituted on the discharge end of the gun. In many cases it is very advantageous to be able to adjust or vary the dimensions of the spray, in accordance with the kind of work being done, the material being used and the conditions under which said work is being done.

An object of this invention, therefore, is the provision of such a device in which the nozzle is constructed so that it may be readily adjusted to vary the dimensions of the liquid spray, and in which this adjustment may be readily accomplished and the parts firmly and securely held in their adjusted position.

Further objects include improvements in details of construction and arrangement which are shown in the drawings and described in the following specification.

To the accomplishment of the foregoing and such other objects as may hereinafter appear, this invention consists in the construction, combination and arrangement of parts hereinafter described and then sought to be defined in the appended claims, reference being had to the accompanying drawing forming a part hereof and which show, merely for the purpose of illustrative disclosure, several embodiments of my invention, it being expressly understood, however, that various changes may be made in practice within the scope of the claims without digressing from my inventive idea.

In the drawing

Figure 1 represents a side elevation of a spray gun having a nozzle constructed in accordance with one embodiment of my invention.

Figure 2 is a vertical longitudinal cross section through the nozzle and discharge end of the gun shown in Figure 1.

Figure 3 is a front elevation of the nozzle with the parts shown in position to give a wide spray of liquid.

Figure 4 is a similar view with the parts adjusted so as to give a narrow liquid spray.

Figure 5 is a disassembled view in perspective of two parts of the nozzle shown in Figures 1 to 4 inclusive.

Figure 6 is a vertical longitudinal cross section through another form of nozzle and the discharge end of a spray gun.

Figure 7 is a front end elevation of this nozzle adjusted to give a wide liquid spray.

Figure 8 is a view similar to Figure 7 with the parts adjusted so as to give a narrow liquid spray.

Figure 9 is a disassembled view in perspective of two parts of the nozzle shown in Figures 6 to 8 inclusive.

Figure 10 is a vertical longitudinal cross section of another form of nozzle applied to the discharge end of a spray gun.

Figure 11 is a front end elevation of the nozzle of Figure 10 adjusted so as to give a wide spray.

Figure 12 is a view similar to Figure 11 with the parts adjusted so as to give a narrow spray.

Referring now to the drawing and first to Figures 1 and 2, the numeral 1 designates the body of the device as a whole which includes the barrel portion 2, the handle portion 3, the handle portion extending downwardly from the barrel portion and inclined slightly to the rear to afford a convenient grip for the operator. The handle portion 3 is provided with a threaded nipple 4 adapted to connect the spray gun to a suitable source of air or other fluid under pressure, the device being provided with suitable valves, not shown, so that when the trigger 5 is pulled, air passes therethrough to the discharge end by means of port or passage 6, see Figure 2. The paint or other liquid to be sprayed is admitted into the device through the screw-threaded connection 7 and its discharge is controlled by the valve rod 8 having the valve 9 formed or provided on its outer end and adapted to seat against the edge of the port or passage 6 which extends longitudinally through the fluid tip 11. This fluid tip 11 is screwed to the end of the barrel 2 (see Figure 2), so that when the valve rod 8 and the connected valve 9 is removed from its seat by the operation of the trigger 5, the paint or other liquid will pass through the fluid tip into the inside of the nozzle structure. As previously described, air or other fluid under pressure has already been flowing through the port or passage 6 and into and through the nozzle structure as a whole.

This construction is similar to that shown in my previous patent above referred to and it is therefore not believed to be necessary to either illustrate or describe further details of construction and operation of these parts.

In that previous patent I show and describe 45
a nozzle which fits over the fluid tip and is secured to the discharge end of the spray gun, the nozzle having a single fixed discharge orifice which is shown in several forms. This construction ensures excellent results where there is no necessity for adjusting or regulating the dimensions of the spray on short notice. If it is desired to change the dimensions of the spray, of course the change is made in the nozzle itself.

In the present invention I provide a nozzle member which is composed of a plurality of parts which may be adjusted with respect to each other so as to constitute valves on the nozzle to vary the dimensions of the discharge orifice and therefore the dimensions of the paint spray. One form is shown in Figures 1 to 5 inclusive to which attention will first be directed. In this form the main nozzle member is designated by the reference character 12. It is of general conical form and is provided with the general conical or tapered inner chamber 13 into which the fluid tip 14 projects. This nozzle member is provided with the end annular flange 14 which is engaged by the inwardly extending flange 15 on the locking ring 16 which has a screw threaded engagement with the discharge end of the barrel 2 of the spray gun.

The nozzle member 12 has a conical tip or end portion 17 which provides a conical or tapered face or surface 18 extending upwardly from a cylindrical portion 19 which projects from the straight shoulder portion 20 which is provided with external screw threads 21. An adjustable tip member 22 is provided which has an annular end flange 23 adapted to be engaged by the inwardly extending flange 24 on locking ring 25 which has an internal screw threaded part 26 to engage the screw threads 21 on the nozzle member. This provides a convenient means of holding the tip member 22 in place on the nozzle member and a ready means for releasing this tip member so that it may be adjusted with respect to the nozzle member. A portion of the nozzle member is provided with the slot 27 which extends across the entire end of the same and down into the conical or tapered side surface 18 as indicated at 28. This slot communicates with the cylindrical inside chamber or compartment 29 of the nozzle. The tip member 22 is provided with a general conical or tapered end portion 30 which corresponds to and fits upon the conical or tapered end 18 of the nozzle member. This tapered end portion 30 of the tip member 22 is tapered inside so as to have a nice bearing fit upon the tapered or conical end 18 of the nozzle member so that it may readily rotate and turn thereupon. The parts are so dimensioned that when the tip member 22 is in position on the end of nozzle member 12 the rear face of the annular flange 23 of the tip member does not contact with the shoulder 20 on the nozzle member. The conical or tapered end part 30 of the tip member 22 is provided with a pair of cut-out portions 31, one side of the cut being downwardly curved as at 32 and the other side 33 being substantially the same as at 32. In addition, the face of the downwardly curved or inclined cut is itself inclined away from the inside thereof so as to form a sharp meeting edge 34 on the side to fit against the tapered face 18 of nozzle member 12. The cut-out parts are duplicated of each other with the vertical edge 35 being substantially diametrically opposite each other and the downwardly curved portions being also opposite each other.

The end of the tip member is open as at 35 so that the upper edges 36 thereof are in substantially the same plane as the end face of the nozzle member when assembled.

The operation of this form of my invention will now be explained. When the trigger 5 is actuated, air will be admitted through the connection 4, air valves in the gun to passage 6, to the conical chamber 13 within the nozzle member 12 and will pass through the cylindrical chamber or compartment 28 and slot 27. The paint or other liquid to be applied passes through the connection 1, past the valve 7 through port or passage 10 and is broken up within the nozzle member 12 by the action of the air flowing therethrough passing through the cylindrical chamber or compartment 29 and the slot 21 to be applied to the surface being treated. This action is substantially the same as that shown in my patent previously referred to.

With the parts 12 and 22 in the position shown in Figure 4, the effective width of the slot 27 is the diameter of the end surface of the nozzle member. This results in a spray of comparatively narrow width. If it is desired to widen this spray, the collar or sleeve 25 is released and the adjustable tip member 22 turned so as to uncover parts of the side portions 28 of the slot 21, the tip member turning readily upon the conical bearing surface 18 of the tapered end of the nozzle member. When the desired adjustment is made the sleeve or collar 25 is tightened upon the threads 26 and the adjustible tip member 22 secured firmly. The adjustment may be made to uncover part or substantially all of the side portions 28 of the slot 27. This cutting off is accomplished by the curved edges 31 so that the exposed length of the side portions 28 of the slot may be readily and accurately changed. Due to the inclination of the curved cut-out portions 32, the sharp meeting edge 34 is provided which gives a very sharply defined cut-off of the side portions 28 of the slot. Of course if the parts are adjusted to the maximum point as indicated in Figure 3, a very wide spray is discharged from the nozzle, and if it is desired to lessen the width of the spray the collar or sleeve 25 is released and the adjustable tip member 22 turned so as to cut off more or all of the side portions 28 of the slot 27. The edges of the cut-out arcuate portions cooperating with the slots in the conical part thus serve as valves on the nozzle member.

In the form of device shown in Figures 6 to 9 inclusive, the parts of the gun of course are similar to those previously described, and furthermore, the nozzle member 31 is constructed substantially the same as nozzle member 12 with the exception of its discharge end. It is secured in position on the discharge end of the gun by means of a sleeve or collar 38 which is similar to sleeve or collar 16 and has the internal tapered or conical chamber 33 and cylindrical discharge opening or compartment 40. The end face of the nozzle member 31 has a plurality of cut-out portions in the form of straight or vertical cut-out portions 41 terminated in the abrupt shoulders 42. The inner edges 43 of these cut-out portions communicate directly with the cylindrical port or passage 40 and provide flared outlets therefor.

The adjustable tip 45 in the member 44 having an end flange 45 whereby it is secured to the nozzle member 31 by means of the sleeve or collar 46, this connection being similar to the connection 23, 24, 25 and 26 of the form of
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device previously described. The cap member 44 is rotatably mounted upon the end 47 of the nozzle member 37, its inner face resting against the outer face 48 of end 47. The cap member 44 is provided with an elongated narrow slot 49 diametrically positioned therein and providing the discharge slot for the discharge spray.

It is readily seen that by turning the cap 44 with respect to the nozzle member 37 the effective discharge may be varied from the minimum shown in Figure 8 to the maximum shown in Figure 7, the sides of the slot 48 serving to cut off the cam shaped cut-out portions 41 in the end of the nozzle member and thus serve as valves to vary the width of the spray being discharged from the nozzle.

In the form of device shown in Figures 10, 11 and 12, the parts of the gun are substantially the same and the nozzle member 50 is quite similar to the nozzle member 12 of Figures 1 to 5 inclusive. It has an annular connection to the discharge end of the gun and has a similar conical or tapered internal compartment 51 and cylindrical discharge chamber or passage 52 leading to a slot 53 which is cut into sides of the conical or tapered end 54 thereof. The adjustable tip is somewhat different from the tip previously described. It includes a cap member 55 having a tight frictional fit upon the end of the nozzle member 56 with a knurled flange 58 to afford a grip for manual adjustment.

This cap has a tapered or inner surface 57 tightly fitting the complementary part of the end of the nozzle member 56 and also has a blunt end face 58 which terminates in substantially the same plane as the reduced end of the nozzle member 50. This face 58 is provided with a slot or kerf 59 cut into its outer surface on each side of the central opening therethrough, these slots or kerfs being curved downwardly and being adapted to register with the slot 53 formed in the end of nozzle member 50 in one adjusted position of the parts, see Figures 10 and 11. This position gives the maximum effective width for the discharge spray. If the adjustable tip is turned so as to bring the slots or kerfs 59 into non-registering or non-aligning position with respect to the slot 53, the minimum effective width of spray is achieved. In this form of device only two adjustments are provided for.

It is seen, therefore, that I have provided in various forms of construction a device which may be readily adjusted to give various widths of sprays. Furthermore, these sprays are substantially fan shaped which is the most effective and efficient form of spray for painting, coating and similar purposes. The constructions provide a wide range of widths by very simple and effective adjustments and the parts are very securely held in the adjusted positions. This invention obviates the necessity for the provision of a variety of nozzle members or parts which have to be removed or replaced in order to obtain the same results as far as the form and dimensions of the spray are concerned. Furthermore, instead of being limited to a few changes in dimension, according to the number of nozzle parts provided, the entire range between minimum and maximum may be covered by the one construction.

This application is filed as a continuation of my copending application Serial Number 729,925, filed June 9, 1894.

What I claim is:
1. A device of the character described, including, in combination, a spray gun having connections for fluid pressure and also a liquid supply leading to the nozzle portion thereof, a fluid tip secured to the end of the nozzle portion of the gun in valveless communication with the source of liquid supply, said fluid tip having a discharge end, a nozzle member secured to the nozzle portion of the gun and fitting over said fluid tip to provide a chamber in which fluid under pressure is admitted to atomize or break up the liquid discharged from the fluid tip or nozzle member being composed of two parts, one part having a conical portion provided with a discharge slot in alignment with the discharge end of the fluid tip, the said slot extending into the side wall of the conical portion, the other part of said nozzle member also having a conical portion fitting the first part and provided with cut-out accurate portions extending through the side wall of said last-mentioned conical portion and adapted to cooperate with ends of said discharge slot.
2. In a device of the character described, adapted to be mounted on the discharge end of a paint spray gun, a nozzle member composed of two parts, one part being of general conical shape with an inside chamber or compartment and hav-
tions for fluid pressure and also a liquid supply leading to the nozzle portion thereof, a fluid tip secured to the end of the nozzle portion of the guide in valved communication with the source of liquid supply, said fluid tip having a discharge end, a nozzle member secured to the nozzle portion of the gun and fitting over said fluid tip to provide a chamber in which fluid under pressure is admitted to atomize or break up the liquid discharged from the fluid tip, said nozzle member being composed of two parts, one part being in the form of a hollow truncated cone fitting the hollow cone portion of said first part and being rotatably mounted thereon, said second hollow cone being provided with cut out portions for cooperating with the ends of said discharge slot, one side of each cut being substantially along a straight line and the other side of the cut being curved to meet said straight line cut so that the relative rotation of said parts will vary the effective dimensions of said discharge slot.

6. A device of the character described, including, in combination, a spray gun having connections for fluid pressure and also a liquid supply leading to the nozzle portion thereof, a fluid tip secured to the end of the nozzle portion of the gun in valved communication with the source of liquid supply, said fluid tip having a discharge end, a nozzle member secured to the nozzle portion of the gun and fitting over said fluid tip to provide a chamber in which fluid under pressure is admitted to atomize or break up the liquid discharged from the fluid tip, said nozzle member being composed of two parts, one part being in the form of a hollow truncated cone fitting the hollow cone portion of said first part and being rotatably mounted thereon, said second hollow cone being provided with cut out portions for cooperating with the ends of said discharge slot, one side of each cut being substantially along a straight line and the other side of the cut being curved to meet said straight line cut so that the relative rotation of said parts will vary the effective dimensions of said discharge slot.

7. In a combination in a paint spraying device, a body having connections for fluid pressure and a liquid to be atomized and sprayed, said body having a discharge end, a nozzle member mounted upon said discharge end and provided with an internal chamber or compartment adapted for mixing or atomizing liquid, said nozzle member comprising two parts, the inner part being in the form of a truncated hollow cone having a discharge slot extending across the smaller end, said slot having tapered ends, the other nozzle part being in the form of a hollow truncated cone fitting the hollow cone portion of said first nozzle part and being rotatably mounted thereon, said second hollow cone portion being provided with cut out portions for cooperation with the ends of said discharge slot, one side of each cut being substantially along a straight line and the other side of each cut being curved to meet said straight line cut so that the relative rotation of said parts will vary the effective dimensions of said discharge slot.

8. A device of the character described, including, in combination, a spray gun having connections for fluid pressure and also a liquid supply leading to the nozzle portion thereof, a fluid tip secured to the end of the nozzle portion of the gun in valved communication with the source of liquid supply, said fluid tip having a discharge end, a nozzle member secured to the nozzle portion of the gun and fitting over said fluid tip to provide a chamber in which fluid under pressure is admitted to atomize or break up the liquid discharged from the fluid tip, said nozzle member being composed of two parts, one part being in the form of a hollow truncated cone having a discharge slot in alignment with the discharge end of said fluid tip, said slot extending entirely across and down into the end of said first mentioned truncated cone to form a diametral slot of some depth, the slot being narrow at the end of said first mentioned truncated cone and increasing in width inwardly of the end of said first mentioned truncated cone, the other part of said nozzle member being in the form of a hollow truncated cone fitting the hollow cone portion of said first part and being rotatably mounted thereon, said second hollow cone being provided with cut out portions for cooperating with the ends of said discharge slot, one side of each cut being substantially along a straight line and the other side of the cut being curved to meet said straight line cut so that the relative rotation of said parts will vary the effective dimensions of said discharge slot.

9. A device of the character described, including, in combination, a spray gun having connections for fluid pressure and also a liquid supply leading to the nozzle portion thereof, a fluid tip secured to the end of the nozzle portion of the gun in valved communication with the source of liquid supply, said fluid tip having a discharge end, a nozzle member secured to the nozzle portion of the gun and fitting over said fluid tip to provide a chamber in which fluid under pressure is admitted to atomize or break up the liquid, discharged from the fluid tip, said nozzle member being composed of two parts, one part being in the form of a hollow truncated cone having a discharge slot in alignment with the discharge end of said fluid tip, said slot extending entirely across and down into the end of said first mentioned truncated cone, the other part of said nozzle member being in the form of a hollow truncated cone fitting the hollow cone portion of said first part and being rotatably mounted thereon, said second hollow cone being provided with cut out portions for cooperating with said discharge slot, one side of each cut being substantially along a straight line and the other side of the cut being curved to meet said straight line cut so that the relative rotation of said parts will vary the effective dimensions of said discharge slot.

10. In a spray gun, the combination of a tubular nozzle having a closed end, said end being provided with a substantially diametral slot which has a diametral portion extending across the end face of said closed end, and longitudinal...
portions extending along the tubular wall of said end and joining said diametral portion, a liquid delivery jet tip within said nozzle positioned for the spraying of the liquid through the slots, and valves on the nozzle cooperating only with the longitudinal portions of said slot and mounted for gradual advancement and retraction lengthwise thereof for adjusting the effective length of the longitudinal portions of said slot, which are unobstructed for the free delivery of the liquid spray except for said valves.

11. In a spray gun, the combination of a tubular nozzle having a closed end, said nozzle having a substantially diametral slot of uniform width through its closed end and sides, a liquid delivery jet tip within said nozzle positioned for the spraying of the liquid through the slot, and a valve at the side of the nozzle cooperating only with the aforesaid side portion of the slot, said valve being mounted for gradual advancement and retraction lengthwise of said side portion which except for the said valve is unobstructed for the free delivery of the liquid spray.

12. In a spray gun, the combination of a tubular nozzle having walls which converge to a closed end, said nozzle having a substantially diametral slot of uniform width through its closed end and converging sides, a liquid delivery jet tip within said nozzle positioned for the spraying of the liquid through the slot, and valves at the sides of the nozzle cooperating only with the aforesaid side portions of the slot, said valves being mounted for gradual advancement and retraction lengthwise of said side portions which except for the said valves are unobstructed for the free delivery of the liquid spray.

13. In a device of the character described, a nozzle member adapted to be mounted on the discharge end of a paint spray gun, said nozzle member being composed of two parts, the inner part being in the form of a truncated hollow cone having a discharge slot extending across the smaller end, said slot having tapered ends extending into the side wall of said inner part, the other nozzle part being in the form of a hollow truncated cone fitting the hollow cone portion of said first nozzle part and being rotatably mounted thereon, said second hollow cone portion being provided with cut-out portions for cooperation with the ends only of said discharge slot, one side of each cut-out portion being substantially along a straight line, and the other side of each cut-out portion being curved to meet said straight line cut so that the relative rotation of said parts will vary gradually the effective dimensions of said discharge slot.

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