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ACID SPRAY GUN

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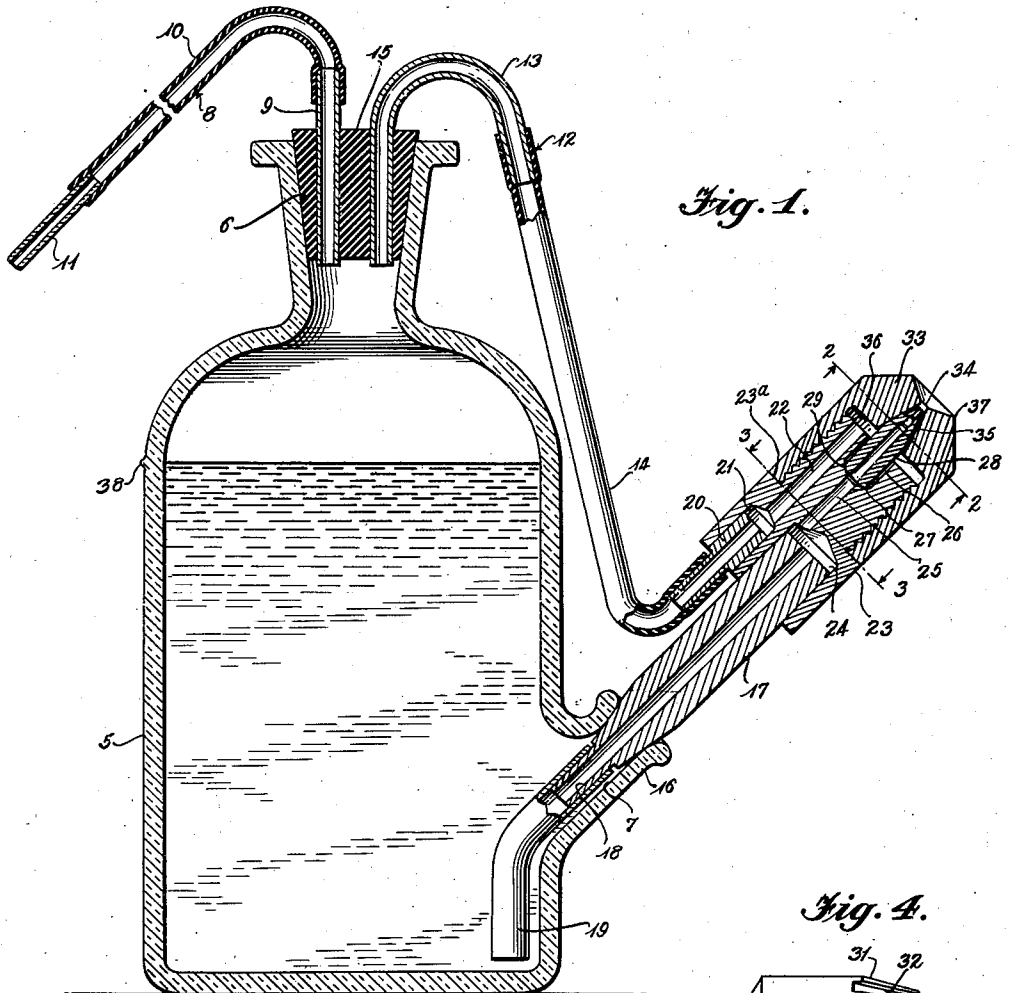


Fig. 1.

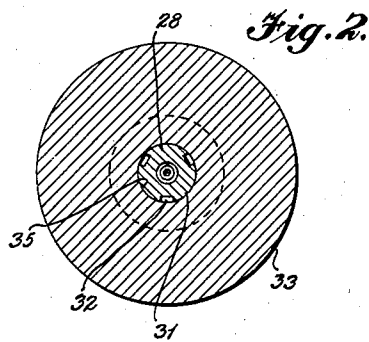


Fig. 2.

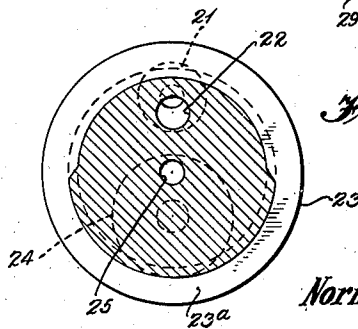


Fig. 3.

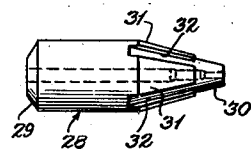


Fig. 4.

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ACID SPRAY GUN

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3 Claims. (Cl. 299—95)

This invention relates to an acid spray gun particularly intended for use in spraying chemicals on slashes in pine trees in order to stimulate and increase the yield of resins and gums. The Southern Forest Experiment Station of the United States Department of Agriculture has developed a process for stimulating the flow of resins and gums from slashes in pine trees which involves spraying the slashes with certain chemicals. The chemical presently employed is sulphuric acid in concentrations ranging from 40% to 60%. In carrying out this process it is necessary to completely and uniformly cover the slash to the limit of its ability to absorb the acid without, however, leaving any excess acid which would run off with the resin or gum. The quantity of acid required for each application to a slash is from 1 to 2 cubic centimeters.

The present application describes and claims a spray gun which is particularly suitable for discharging small amounts of atomized acid onto the tree slashes in carrying out the process described above.

Among the objects of the invention are to provide a spray gun which will project a finely atomized jet of acid at the proper angle for covering slashes in trees; to eliminate the necessity for using pumps or other mechanical devices; to reduce to a minimum the air pressure required for delivery and atomization of acids by reducing the distance which the acid must travel in reaching the atomizing nozzle; to provide an air and acid nozzle assembly which provides for automatically positioning the acid and air orifices in proper relationship; to provide for ease and facility in cleaning all parts of the spray gun; to provide means to prevent the nozzle discharge orifices from becoming clogged if the nozzle is accidentally brought into contact with the resins or gums of a tree slash; and to provide a spray gun which can be manufactured at low cost and which utilizes many component parts which are readily available on the market. Other objects and advantages of the invention will be specifically referred to in the following detailed description of one form of the invention:

In the drawing

Figure 1 is a longitudinal sectional view of an acid spray gun which embodies my invention;

Figure 2 is an enlarged sectional view looking in the direction of the arrows 2—2 in Figure 1;

Figure 3 is an enlarged sectional view looking in the direction of the arrows 3—3 in Figure 1; and

Figure 4 is a side elevation view of the tubular acid nozzle.

An acid container in the form of a flask is designated by the reference numeral 5 and is provided with an upper opening 6 at its upper end and a lower opening 7 in a side wall of the flask near the lower end thereof. An air inlet tube, designated generally by the reference numeral 8 and which may consist of a glass tube 9, a rubber tube 10 and a glass mouthpiece 11, leads into the upper opening 6 of the acid container 5. An air outlet tube, designated generally by the reference numeral 12, leads from the upper opening 6 and may consist of a curved glass tube 13 and a rubber tube 14. An apertured stopper 15 of rubber or other suitable material provides a seal which prevents egress of air between the tubes 9 and 13 and the upper opening 6 of the acid container.

The lower opening 7 is formed by a neck portion 16 which extends upwardly and outwardly from the acid container 5 at an angle of approximately 45° to vertical. A tubular acid conduit 17 is received within the lower opening 7 and makes sealing engagement therewith. The inner end 18 of the acid conduit 17 is preferably provided with a tube 19 which extends to adjacent the bottom of the acid container 5.

The air outlet tube 12 is preferably provided at its outer end with an adapter fitting 20 for engagement with the enlarged lower end 21 of an air passageway 22 in a nozzle body 23. The outer end of the acid conduit 17 is fitted into the enlarged lower end 24 of an acid passageway 25 also located in the nozzle body 23.

The acid passageway 25 is counterbored at its upper end, as indicated by the reference numeral 26, to provide a tapered shoulder 27. The counterbored portion 26 of the acid passageway 25 receives a tubular acid nozzle which is designated by the reference numeral 28 and which is best shown in Figure 4. The rear face of the acid nozzle 28 is frusto-conical, and its taper is complementary to the tapered shoulder 27 as shown by the reference numeral 29 in Figure 4. The outer tip 30 of the acid nozzle is frusto-conical and to the rear of the tip 30 there is an upwardly stepped frusto-conical portion 31 which is provided with longitudinally extending grooves or flutes 32.

An air nozzle 33 is threaded onto the nozzle body 23 and is provided with an orifice 34. The inner portion 35 of the orifice 34 has a taper which is complementary to the frusto-conical portion 31 of the acid nozzle 28. The air nozzle 33 is threaded onto the nozzle body 23 until the acid nozzle 28 is clamped into position by engage-

ment of its tapered rear face 29 with the tapered shoulder 27 of the enlarged portion 26 of the acid passageway 25 and also by engagement of its frusto-conical portion 31 with the tapered portion 35 of the orifice 34 in the air nozzle 33. It will be noted that the clamping action just referred to serves to properly center the acid nozzle 28 with respect to the acid passageway 25 and the orifice 34. The dimensions of the component parts of the nozzle assembly are such that simultaneously with the clamping action on the acid nozzle 28, the threaded flange of the air nozzle 33 abuts against the shoulder 23a on the nozzle body 23 to thus prevent leakage.

The air passageway 22 terminates at its outer end in an annular space 36 between the outer end of the nozzle body 23 and the air nozzle 33. This annular space 36 communicates with the grooves or flutes 32 in the acid nozzle 28. The outer tip of the air nozzle 33 is provided with a rim or flange portion 37 which extends beyond the orifice 34 so that this orifice will not be clogged in the event that the nozzle assembly is accidentally brought into contact with gum or resin on a tree slash.

In operation the acid container 5 is supplied with acid to approximately the level of the index mark 38 on its side wall. It will be noted that when the spray gun is held in the vertical position shown in Figure 1, the proper liquid level after filling the acid container lies just slightly below the outer tip of the acid nozzle 28. The user directs the nozzle assembly toward a tree slash which is to be treated with acid, places the mouthpiece 11 to his lips and blows air through the air inlet tube 8 into the upper portion of the acid container 5. This creates a slight air pressure in the acid container 5 above the level of the acid therein. This pressure is sufficient to cause acid to flow through the acid conduit 17, the acid passageway 25 and the tubular acid nozzle 28 to the aperture 34. At the same time that acid is being caused to flow to the nozzle assembly, air flows through the air outlet 12 to the air passageway 22, the annular space 36 and the grooves or flutes 32 in the frusto-conical portion 31 of the acid nozzle 28. The air passing through the flutes 32 forms a plurality of air jets which impinge on the jet of acid issuing from the acid nozzle 28. Effective atomization of the acid is thus obtained within the aperture 34 and the acid is thus directed as a fine fog or mist onto the tree slash.

It has been mentioned that when the acid container 5 is filled to the proper level very little air pressure is required to cause a jet of acid to issue from the acid nozzle 28. As the supply of acid becomes depleted within the acid container, it is possible to merely tilt the acid container to thus lower the nozzle assembly with respect to the level of acid within the container. While such tilting will cause some change in the angle at which the acid issues from the nozzle assembly, it will be noted that in all positions of use the atomized acid will be projected outwardly and upwardly onto the tree slash.

The entire assembly can be readily taken apart for cleaning. The existence of the upper open-

ing 6 and the lower opening 7 facilitates flushing the acid container 5. The nozzle body is removable from the air outlet tube 12 and removal of the air nozzle 33 permits easy cleaning of all portions of the nozzle assembly.

No adjustment of the component parts of the nozzle is necessary since the cooperating portions of the nozzle are automatically self-centering and their proper relative positions are automatically maintained. All portions of the nozzle assembly are readily formed by simple turning and drilling operations, with the exception of the formation of the flute 32 which can be readily formed by a grinding or milling operation.

It will be apparent that it would be impossible for the user of the spray gun to suck acid into his mouth if he were to accidentally inhale during use of the apparatus.

It is to be understood that the foregoing detailed description is exemplary only and that various modifications may be resorted to without departing from the scope of my invention as defined by the following claims.

Having thus described my invention, I claim:

1. An acid spray gun for spraying acid on slashes in trees comprising an acid container having an upper opening in the upper portion thereof and a lower opening in a side wall near the lower end thereof, an acid conduit extending upwardly and outwardly from said lower opening, an air inlet tube leading to said upper opening, an air outlet tube leading from said upper opening to adjacent the outer end of said acid conduit, means for sealing said upper opening around said tubes, and an atomizing nozzle assembly secured to the outer ends of said acid conduit and said air outlet tube whereby air introduced under pressure into said acid container through said air inlet tube forces acid upwardly and outwardly through said acid conduit to said nozzle assembly and air passing to said nozzle assembly through said air outlet tube effects atomization of such acid.
2. An acid spray gun as described in claim 1 in which said atomizing nozzle assembly includes a tubular acid nozzle member communicating with said acid conduit and an air nozzle member surrounding the outer end of said acid nozzle member and communicating with said air outlet tube.
3. An acid spray gun as described in claim 1 in which said nozzle assembly comprises a nozzle body having an air passageway and a separate acid passageway extending therethrough, said acid passageway being outwardly flared at its discharge end, a tubular acid nozzle having one end received in and concentrically positioned in the flared end of said acid passageway, the opposite end of said acid nozzle being tapered inwardly and having flutes on the inwardly tapering surface, an air nozzle secured to said nozzle body and having an air discharge orifice tapered complementarily to and receiving said tapered end of said acid nozzle whereby said flutes provide air discharge passageways along the tapered end of said acid nozzle and said air nozzle retains said tubular acid nozzle in position.

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