B. P. HALL.

PNEUMATIC SPRAYER OR AIR BRUSH.

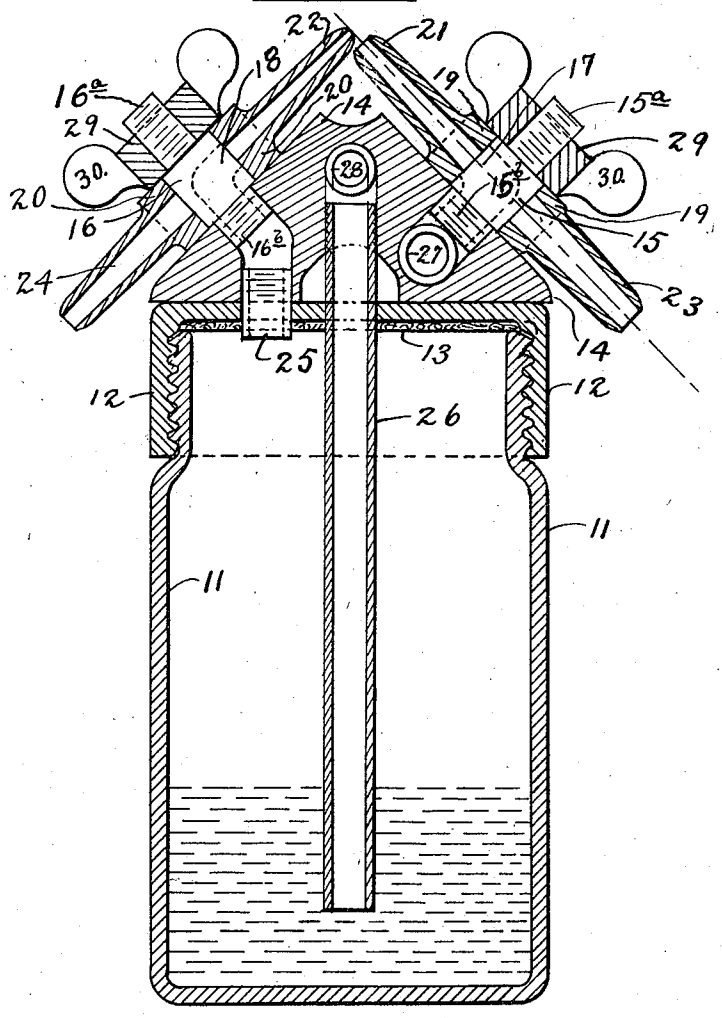
APPLICATION FILED JAN. 13, 1916.

1,179,095.

Patented Apr. 11, 1916.

2 SHEETS—SHEET 1.

FIG. 1.



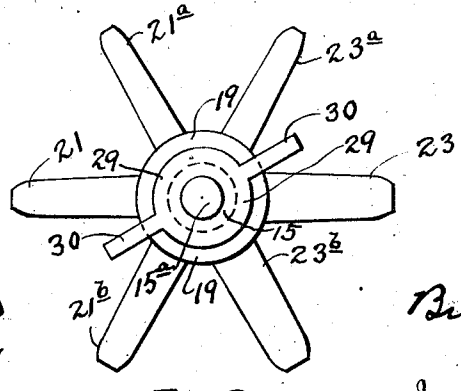


FIG. 2.

WITNESSES:

Frank C. Hewens

Frederick G. Mitchell

INVENTOR

Burton P. Hall

BY

Israel Benjamins,

ATTORNEY

B. P. HALL.

PNEUMATIC SPRAYER OR AIR BRUSH.

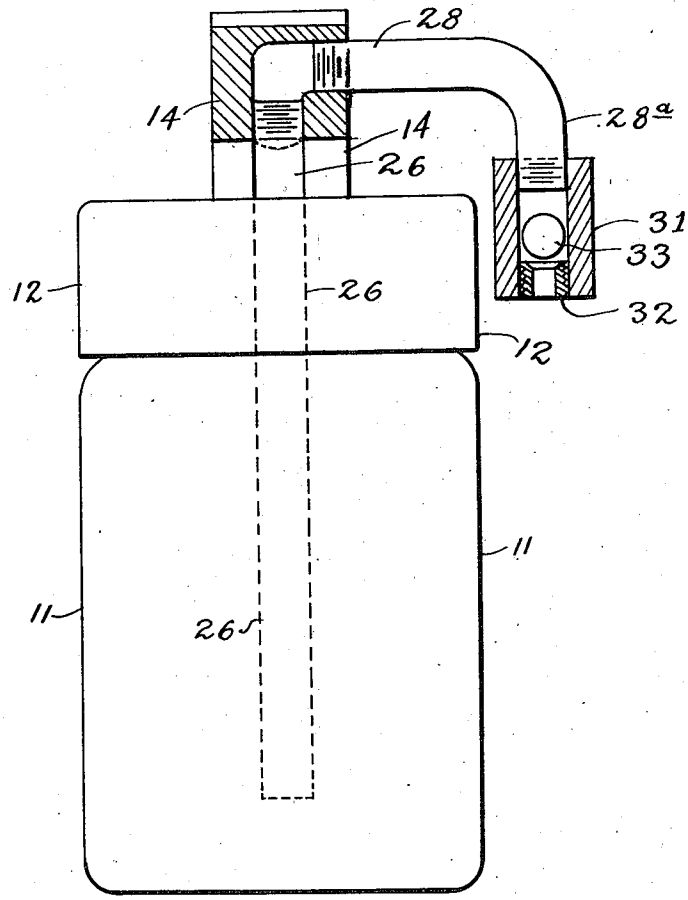
APPLICATION FILED JAN. 13, 1916.

1,179,095.

Patented Apr. 11, 1916.

2 SHEETS—SHEET 2.

FIG. 3.



WITNESSES:

Frank E. Stevens,

Frederick G. Mitchell

INVENTOR

Burton P. Hall

BY

Israel Benjamins,

ATTORNEY

UNITED STATES PATENT OFFICE.

BURTON P. HALL, OF FANWOOD, NEW JERSEY.

PNEUMATIC SPRAYER OR AIR-BRUSH.

1,179,095. Specification of Letters Patent. Patented Apr. 11, 1916.

Application filed January 13, 1916. Serial No. 71,959.

To all whom it may concern:

Be it known that I, BURTON P. HALL, a citizen of the United States, residing at Fanwood, in the county of Union and State of New Jersey, have invented a new and useful Pneumatic Sprayer or Air-Brush, of which the following is the specification.

My invention relates to improvements in a pneumatic sprayer or air brush for inks, paints, varnishes, enamels, liquid bronzes and similar substances, and it consists in the novel features hereinafter more fully described.

The objects of my improvement are: 1st. To produce a universal spraying device applicable to liquids of different degrees of density and viscosity. 2d. To produce a pneumatic sprayer or air brush, which is adapted to have a wide range of variation in the rate of discharge of the liquid sprayed. 3d. To produce a pneumatic sprayer or air brush, which is adapted to vary the work with the same liquid sprayed, according to the requirements in each case, and to be able to produce very fine lines as well as to do rapid surface painting or coloring and similar work. 4th. To produce a pneumatic sprayer or air brush, which is adapted to work with a comparatively low pressure of air or other gas. 5th. To have said pneumatic sprayer or air brush simple, durable and inexpensive. I attain these objects by the apparatus illustrated in the accompanying drawings or by any mechanical equivalent or obvious modification of the same.

In the drawings Figure 1 is a vertical section of my apparatus by a plane passing through the axis of the container or receptacle of the liquid sprayed and through the axes of the two revolving members hereinafter described. Fig. 2 is a view of the revolving gas discharging member in a plane parallel thereto, and perpendicular to the axis of rotation thereof. Fig. 3 is a view toward the left in Fig. 1 showing the liquid container or receptacle in elevation and the bridge mounted thereon in section, and omitting the revolving members and their appurtenances.

Similar numerals and letters refer to similar parts throughout the several views as follows:

11 is the container or receptacle for the liquid sprayed. 12 is the cap for said receptacle, which is shown in Fig. 1 as being screwed on to the neck of said receptacle.

13 is a packing either of felt or of any other suitable material; it is shown in Fig. 1 as placed over the edges of the receptacle 11 at the mouth thereof; it is jammed tight against said edges by means of the threaded cap 12, thereby rendering said receptacle gas tight. 14 is the bridge shown in Figs. 1 and 3 as mounted on said cap 12; it supports the revolving gas discharging member 19 and liquid discharging member 20. 15 is a hub for said gas discharging member 19; it has an interior bent passage 17, which is shown in Fig. 1 as communicating at its inner end with a connection from a source of compressed air or other gas, and at its outer end with the interior of the nozzle 21 of said member 19. The hub 15 terminates at its lower end in a threaded nipple or hollow stud 15^b, which serves as a connection to said bridge 14, which connection incloses the inner end of said passage 17; at its upper end said hub 15 terminates in a stud 15^a, which carries a winged nut 29, which keeps said member 19 in place on said hub 15.

16 is a hub for the liquid discharging member 20; it is similar to the hub 15 above described; it has an interior passage 18, which communicates at its inner end with the interior of said receptacle 11, through an opening in said bridge 14, and the nipple 25, which connects said opening with the interior of said receptacle 11; said nipple 25 passes through the top of said cap 12 and said packing 13; said nipple 25 may be soldered to said cap 12 where it passes therethrough at its lower end, and it is shown in Fig. 1 as screwed into said opening in said bridge 14. 16^a is a stud at the upper end of said hub 16; it carries the winged nut 29, which keeps the liquid discharging member 20 in place on said hub 16. 16^b is a threaded nipple or hollow stud, which forms the lower end of said hub 16; it serves to connect said hub 16 to said bridge 14, and it incloses the inner end of said passage 18.

The gas discharging member 19 is shown in Fig. 2 as having six radial nozzles: 21, 21^a, 21^b, 23, 23^a and 23^b; two of these nozzles, 21 and 23 are shown in section in Fig. 1. It is evident from the drawings that, by turn-

ing said member 19 on said hub 15, any one of the above six nozzles can be brought into registration with the outer end of said passage 17, thereby causing the compressed air or other gas to be discharged through said registering nozzle. These nozzles differ in the amount of area of their cross-section, but they are otherwise similar.

The revolving member 20 is in all respects similar to the member 19; only the nozzles which it carries, have smaller areas of cross-section than those of the member 19; two of these liquid discharging nozzles, 22 and 24 are shown in Fig. 1; the total number of nozzles carried by said member 20 may be six, as in the member 19; either or both of the members 19 and 20 may carry any other number of nozzles, if desired. By revolving said member 20 on said hub 16, any one of its nozzles may be brought into registration with the outer end of said passage 18, thereby causing the liquid in the receptacle to be discharged through that registering nozzle.

As the magnitude and degree of atomization of the jet of liquid applied to any object depends upon the area of cross-section of the liquid discharging nozzle and also upon the magnitude of the jet of air or other gas, for any pressure of the latter, which impinges upon said jet of liquid, it is evident that the number of different jets of said liquid that can be produced by my pneumatic sprayer, for any given pressure of the air or other gas employed, is equal to the product of the number of nozzles in each of the two revolving members; thus: if there be six nozzles in each of the members 19 and 20, then 36 different jets of liquid could be produced thereby. This is strictly correct only when the axis of the gas discharging nozzle is in the same plane with the axis of the liquid discharging nozzle. These results could be still more varied by placing the axis of the gas discharging nozzle somewhat at an angle with the vertical plane passing through the axis of the water discharging nozzle. In this way almost an infinite number of variations can be produced in the character of the jet of liquid sprayed by means of one apparatus.

My pneumatic sprayer, as shown in the drawings, is adapted to be worked largely by gravity feeding, namely: The liquid contained in the receptacle 11 is caused to be discharged by tilting over said receptacle until the liquid will flow out through the nipple 25 and the opening 18 of the hub 16; no pressure of air or other gas is employed for this purpose; the supply of air or other gas under pressure is employed for producing a jet of air or gas, which impinges on said jet of liquid and thereby atomizes the same, but not for feeding of the liquid to be sprayed. A comparatively low pressure of air or gas is therefore sufficient for my apparatus. As the gas jet is discharged from one of the nozzles of the member 19, and when the receptacle 11 is in an upright position, a reduction of pressure is produced in the interior of the receptacle; I employ this reduction of pressure thereby to produce the agitation of the liquid in said receptacle by causing a jet of air from the outside of the receptacle to flow through the intake 32, shown in Fig. 3, under a ball check valve 33, to the interior of the fitting 31, thence through the bent air inlet tube 28—28ª, to an opening in the bridge 14, and thence through the agitator tube 26 into the liquid in the receptacle 11, which liquid is thereby agitated. By this means I save the extra air pressure, which is usually required for agitating said liquid. The ball check valve 33 is employed to prevent any back flow of liquid through said agitator tube 26 and air inlet tube 28—28ª.

30 are the wings on said nuts 29 above described.

The intake 32 has at its upper end a suitable seat for said ball check valve 33, as shown in Fig. 3.

I found that the best results are obtained with my pneumatic sprayer when the liquid discharging nozzle is so placed that it terminates substantially on the axis of the nozzle discharging gas; this results in better economy of the liquid sprayed and in greater effectiveness of the jet. The same advantage could be obtained also in apparatuses having ordinary noninterchangeable nozzles, to a greater or lesser degree, by placing said nozzles in the above described relative positions toward each other.

Many changes could be made in the design and details of my pneumatic sprayer or air brush within the scope of my invention.

The members 19 and 20 are shown in Fig. 1 as being at right angles to each other, and each as inclined at an angle of 45 degrees to the top of said cap 12; either of these two angles may be varied, if desired, especially the latter; the member 20 can be conveniently located on the side of said cap 12 and in a plane parallel to the axis thereof, and said member 19 could then be placed in a plane parallel to the top of said cap 12.

Some of the features of excellence of my apparatus, as above described, could be omitted, if desired, and thereby only part of the advantages thereof could be secured.

Many other changes could be made in my pneumatic sprayer or air brush, without departing from the main scope of my invention. I do not, therefore, restrict myself to the exact design of my apparatus as shown in the drawings; but I intend to include also all mechanical equivalents and obvious modifications of the same.

What I claim as my invention, and desire to secure by Letters Patent is:

1. In a pneumatic sprayer or air brush for liquids a receptacle for the liquid, a passage for said liquid from said receptacle, a member containing a plurality of nozzles for the discharge of said liquid therethrough, said nozzles being of various dimensions and adapted to register with said passage, one at a time, and thereby to discharge each a jet of said liquid of a different magnitude, and a means for impinging a jet of gas against said jet of liquid, thereby atomizing the same.

2. In a pneumatic sprayer or air brush for liquids, a receptacle for the liquid, a means for discharging a jet of said liquid, a connection to a supply of compressed gas, a member containing a plurality of nozzles for discharging said gas therethrough, said nozzles being of various dimensions and adapted to register with said connection, one at a time, and thereby to discharge each a jet of gas of a different magnitude against said jet of liquid, thereby atomizing the same.

3. In a pneumatic sprayer or air brush for liquids, a receptacle for the liquid, a passage for said liquid from said receptacle, a revolving member containing a plurality of nozzles for the discharge of said liquid therethrough, said nozzles being of various dimensions and adapted to register with said passage, one at a time, and thereby to discharge each a jet of said liquid of a different magnitude, and a means for impinging a jet of gas against said jet of liquid, thereby atomizing the same.

4. In a pneumatic sprayer or air brush for liquids a receptacle for the liquid, a means for discharging a jet of liquid from said receptacle, a connection to a supply of compressed gas, a revolving member containing a plurality of nozzles for discharging said compressed gas therethrough, said nozzles being of various dimensions and adapted to register with said connection, one at a time, and thereby to discharge each a jet of gas of a different magnitude against said jet of liquid, thereby atomizing the same.

5. In a pneumatic sprayer or air brush for liquids a receptacle for the liquid, a passage for said liquid from said receptacle, a member containing a plurality of nozzles for the discharge of said liquid therethrough, said nozzles being of various dimensions and adapted to register with said passage, one at a time, and thereby to discharge each a jet of said liquid of a different magnitude, and a nozzle for impinging a jet of gas against said jet of liquid, thereby atomizing the same, each of said liquid discharging nozzles, when in registration with said passage, terminating substantially at the axis of said gas discharging nozzle.

6. In a pneumatic sprayer or air brush for liquids a receptacle for the liquid, a means for discharging a jet of the liquid from said receptacle, a means for impinging a jet of gas against said jet of liquid, thereby atomizing the same, said jet of gas being adapted to produce a reduction of pressure in said receptacle, when the latter is in an upright position, and a means for drawing air from the outside of said receptacle into the interior thereof, by suction due to said reduction of pressure, and through the liquid contained therein, thereby agitating said liquid.

7. In a pneumatic sprayer or air brush for liquids a receptacle for the liquid, a means for discharging a jet of the liquid from said receptacle, a means for discharging a jet of gas for atomizing said jet of liquid, a means for agitating the liquid contained in said receptacle, said jet of gas being adapted to produce a reduction of pressure in said receptacle when the latter is in an upright position, and said agitating means comprising an air tube having its lower end immersed in said liquid and its upper end communicating with the outside of the vessel, and a suitable check valve adapted to prevent the accidental discharge of the liquid from said receptacle through said agitator tube.

8. In a pneumatic sprayer or air brush for liquids a receptable for the liquid, a passage for said liquid from said receptacle and a connection to a source of compressed gas, a member containing a plurality of nozzles for the discharge of said liquid therethrough, also a member containing a plurality of nozzles for discharging said compressed gas therethrough, said nozzles for the discharge of said liquid being of various dimensions and adapted to register with said passage, one at a time, and thereby to discharge each a jet of liquid of a different magnitude, and said nozzles for discharging said compressed gas being also of different dimensions and adapted to register with said connection, one at a time, and thereby to discharge each a jet of gas of a different magnitude against said jet of liquid, thereby atomizing the same.

9. In a pneumatic sprayer or air brush for liquids, a receptacle for the liquid, a passage for said liquid from said receptacle and a connection to a source of compressed gas, a revolving member containing a plurality of nozzles for the discharge of said liquid therethrough, also a revolving member containing a plurality of nozzles for discharging said compressed gas therethrough, said nozzles for the discharge of said liquid being of various dimensions and adapted to register with said passage and thereby to discharge each a jet of liquid of a different magnitude, and said nozzles for discharging said compressed gas being also of different dimensions and adapted to register with said connection, and thereby to discharge each a jet of gas of a different magnitude against

said jet of liquid, thereby atomizing the same.

10. In a pneumatic sprayer or air brush for liquids a receptacle for the liquid, a nozzle for discharging a jet of said liquid from said receptacle, a connection to a supply of compressed gas, a member containing a plurality of nozzles adapted to register with said connection, one at a time, and thereby to discharge each a jet of gas of a different magnitude against said jet of liquid, thereby atomizing the same, and said liquid discharging nozzle terminating substantially at the axis of one of said gas discharging nozzles, the latter being in registration with said connection.

11. In a pneumatic sprayer or air brush for liquids a receptacle for the liquid, a passage for said liquid from said receptacle, a connection to a supply of compressed gas, a member containing a plurality of nozzles adapted to register with said passage, one at a time, and thereby discharge each a jet of liquid of a different magnitude, and a member containing a plurality of nozzles adapted to register with said connection, one at a time, and thereby to discharge each a jet of gas of a different magnitude against said jet of liquid, thereby atomizing the same, and each of said liquid discharging nozzles, when in registration with said passage, terminating substantially at the axis of one of said gas discharging nozzles, the latter being in registration with said connection.

12. In a pneumatic sprayer or air brush for liquids a receptacle for the liquid, a cap for said receptacle, a suitable packing interposed between said cap and said receptacle, thereby rendering the same gas tight, a means for discharging a jet of said liquid from said receptacle, a means for producing a reduction of pressure in said receptacle and a means for drawing air by suction, due to said reduction of pressure, from the outside of said receptacle into the interior thereof and through said liquid, thereby agitating the same.

BURTON P. HALL.

Witnesses:
FREDERICK G. MITCHELL,
JOSEPH J. REARDON.