Jan. 28, 1936. E. S. WARNER 2,029,141

DEVICE FOR SPRAYING

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Fig. 1.

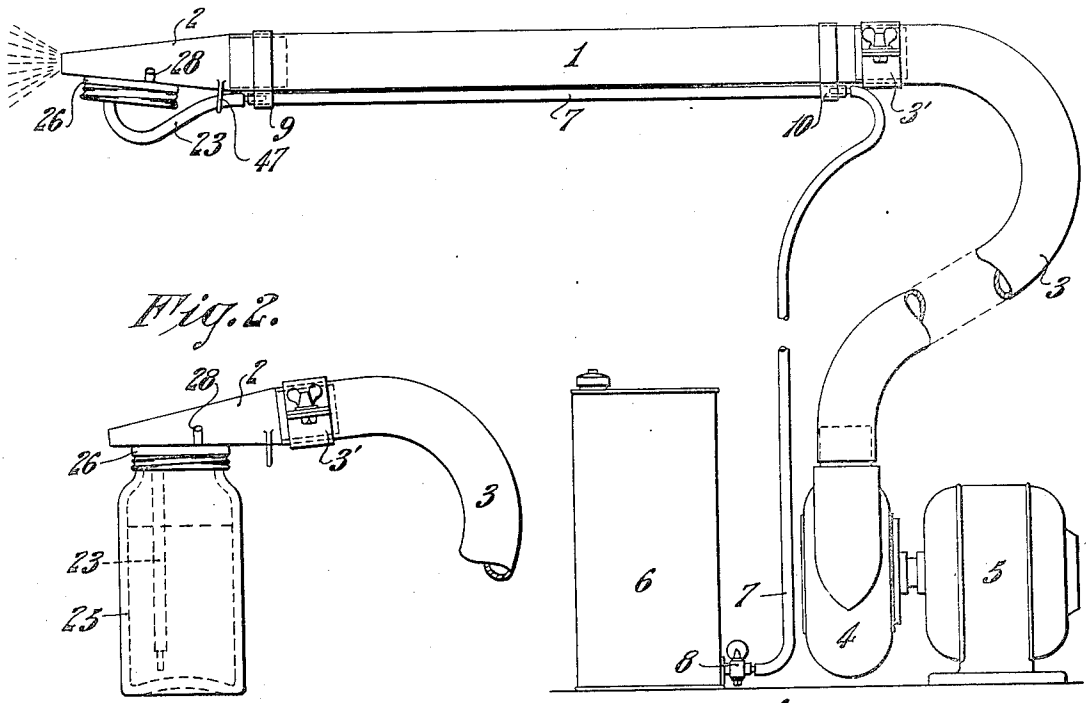


Fig. 2.

Fig. 3.

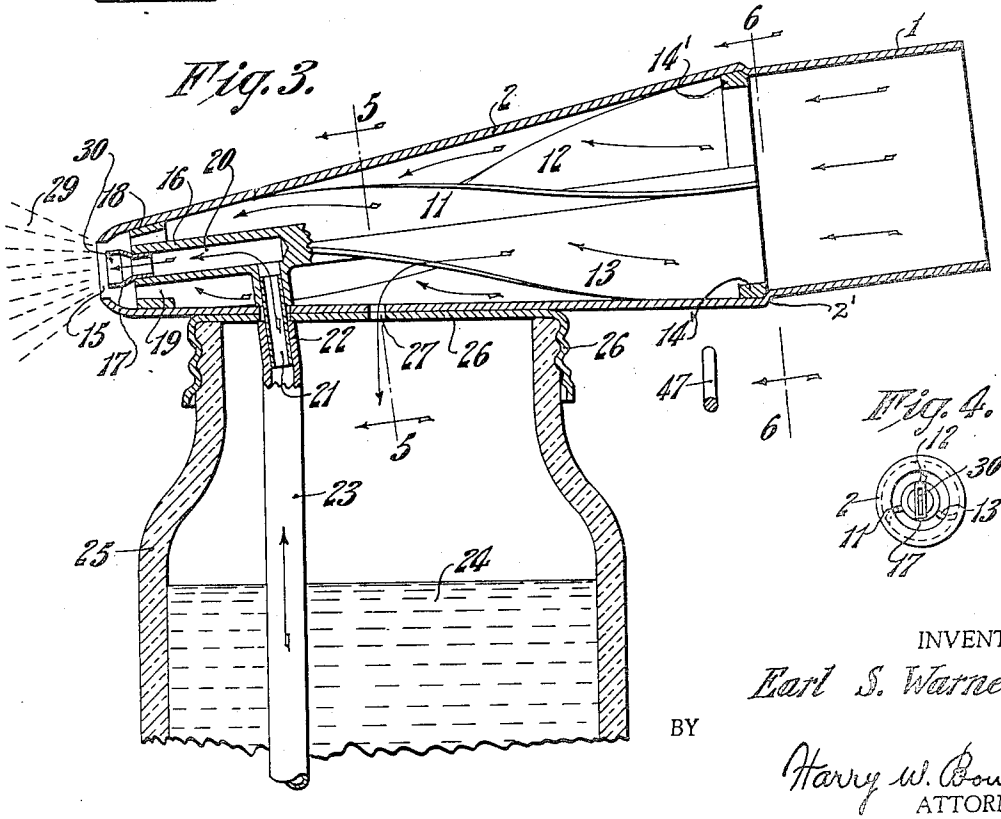


Fig. 4.

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Fig. 5.

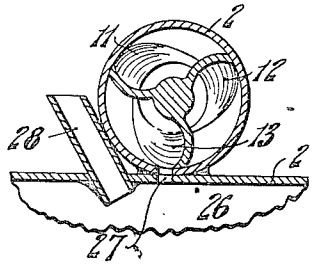


Fig. 6.

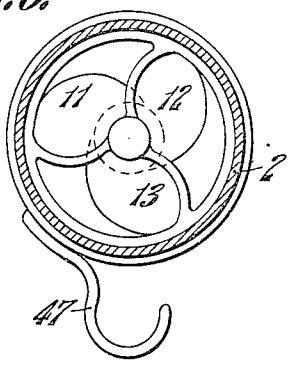


Fig. 7.

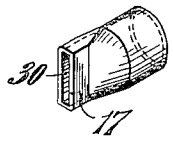


Fig. 8.

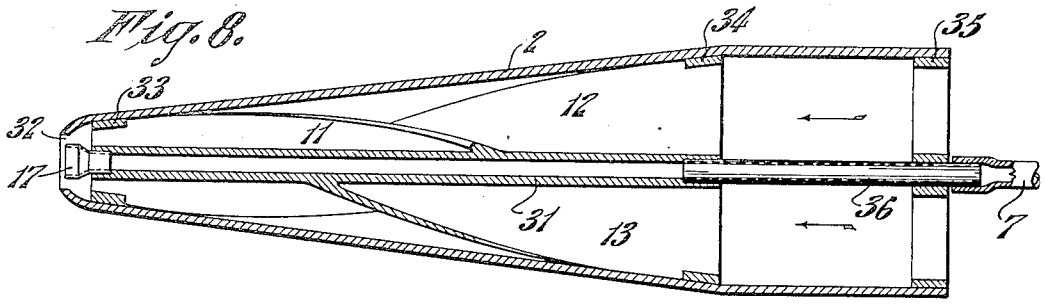


Fig. 9.

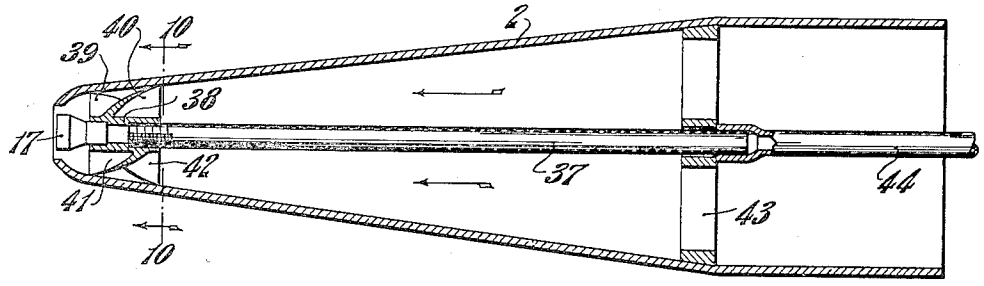


Fig. 10.

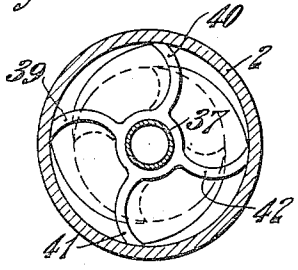
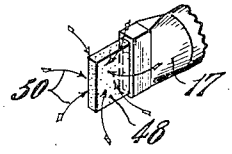


Fig. 11.



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Patented Jan. 28, 1936 2,029,141

UNITED STATES PATENT OFFICE

2,029,141

DEVICE FOR SPRAYING

Earl S. Warner, Yalesville, Conn., assignor to Air-Flo Corporation, Boston, Mass., a corporation of Massachusetts

Application June 11, 1934, Serial No. 730,056

3 Claims. (Cl. 299—39)

This invention relates to improvements in devices for spraying liquid wax, or similar preparations for oiling, or waxing floors, or other surfaces.

An object of the present invention is to provide a construction in which the liquid wax is evenly distributed, in a finely divided spray effect on the floor, as the operator moves the spraying nozzle of the device from one side of the room to the other.

At the present time, the waxlike preparations now in use, are so prepared that they will dry quickly and leave a finished and polished surface.

The invention, broadly, comprises a delivery nozzle for the liquid wax, which is preferably formed with a rectangular-shaped opening from which the liquid wax escapes, as a solid, ribbon stream. This nozzle is located a short distance from the spray delivery end of the combined mixture of air and wax, and is connected to a pipe that conveys the oil, or liquid wax, from a suitable receptacle. Means is provided for forcing air, under pressure, past the exist end of the rectangular-shaped nozzle carrying the liquid wax, and for simultaneously imparting a rotary motion to the air. The mixture of the air and the liquid wax is thus evenly spread onto the floor, or other surface, by the operator, without leaving any spots that are uncovered.

As a modification, the receptacle, which contains the liquid wax, may be removed from the nozzle end of the device and the liquid drawn by suction effect, from a container that is located on the floor, or other support.

Further objects and nature of my invention will appear in the body of the specification and will be particularly pointed out in the claims.

An important feature of my invention is the rectangular-shaped nozzle for the liquid wax.

Referring to the drawings:—

Fig. 1 shows the complete outfit comprising an electric motor, a fan for producing the desired air pressure, a receptacle in which the liquid wax is stored, with a pipe extending therefrom, which is located adjacent the delivery spray nozzle end.

Fig. 2 is a detail view, showing a receptacle containing the liquid wax, that is detachably connected adjacent the spraying nozzle.

Fig. 3 is an enlarged, detail, sectional view of the interior construction of the spraying nozzle, showing the means for imparting a rotary motion to the air, under pressure; also illustrating the means for attaching a jar containing the spraying material to the spraying nozzle.

Fig. 4 is an end view of the wax delivery nozzle, illustrating the rectangular-shaped opening in its end through which the liquid wax passes.

Fig. 5 is a sectional view on the line 5—5 of Fig. 3, looking in the direction of the arrows.

Fig. 6 is a sectional view on the line 6—6 of Fig. 3, looking in the direction of the arrows, showing the curved blades.

Fig. 7 is a detail view of the end of the delivery nozzle for the liquid wax, or other material, illustrating the rectangular-shaped opening.

Fig. 8 is a longitudinal, sectional view of a modification, in which the pipe that conveys the liquid wax is located within the spraying nozzle.

Fig. 9 is a modification in which the helical blades are made shorter and located adjacent the end of the cone-shaped delivery spraying nozzle member.

Fig. 10 is a sectional view on the line 10—10 of Fig. 9, showing the four (4) helical-shaped blades and the pipe conveying the wax in section, and

Fig. 11 illustrates the action of the circular currents of air on the ribbonlike formation of the waxlike substance.

Referring to the drawings in detail:—

1 designates a tubular or pipe member having a conical-shaped spraying end portion 2. The member 1 serves as a handle, when in use. A hose member 3 is connected at one end of the tubular member 1, by means of a clamp 3'; its opposite end is attached to the fan casing 4, carrying a fan that is operated by the electric motor 5, or other means. 6 designates a suitable receptacle, in which the liquid wax, or other material to be sprayed, is placed. Attached to its lower end, is a flexible delivery tube 7, that is controlled by the valve 8. This tube is attached to the tubular member 1, by means of the clips 9 and 10.

The interior construction of the conical-shaped spraying end portion 2 is shown in Fig. 3, in which are located the three (3) curved, or helical-shaped members 11, 12 and 13. These are retained in the conical-shaped member 2, by means of the ring members 10 and 10', which are inserted in the member 2 and retained by the bent portion 2'.

It will be noticed that the members 11, 12, and 13 are made long, for the purpose of permitting the free passage of air, under pressure, through the conical-shaped spray member 2 and for imparting a rotary, or circular motion, to the air, as it leaves the orifice 15. Located within the member 2, is a tubular member 16, in the outer end of which is secured the liquid wax delivery nozzle member 17. The tubular member 16 is located in the spider ring member 18, which is se-

cured in the conical member 2 and provides the air spaces 19. The member 16 is provided with an opening 20, which leads to the passageway 21 of the tubular member 22, which is attached to the pipe 23, that extends downward into the liquid wax, indicated at 24, in the jar 25. This jar is formed with a thread at its upper end, whereby it may be attached and removed from the threaded member 26, that is attached to the conical-shaped spray member 2. 27 designates openings through the members 2 and 26, whereby air, under pressure from the member 2, will enter the upper end of the jar 25, as indicated by the arrow, and force the liquid wax up the tube 23, through the nozzle 17.

Referring to Fig. 1, it will be noticed that the jar 25 is omitted and the tubular member 7, which carries the liquid wax from the receptacle 6 to the interior of the nozzle portion 2, is connected to the pipe member 22. 28 indicates an air inlet opening to the interior of the jar 25. The operation of the apparatus, as shown in Fig. 1, is as follows:—The air from the fan 4 passing through the tubular member 1, under pressure, will produce a vacuum effect at the open end of the conical-shaped spray member 2. This will cause the liquid wax to be drawn through the pipe 7 and escape through the rectangular-shaped nozzle 17 in ribbon shape, where it will come into direct contact with the rotary motion of the air, under pressure, whereby the ribbon of liquid wax will be intimately mixed with the air, as shown by the arrows 29, and a finely divided spray effect will be produced.

In the construction, shown in Fig. 2, and also in Fig. 3, in which the receptacle 6 is omitted and the jar 25 is threaded onto the member 26, the air, under pressure, will enter the jar through the opening 27 and create a pressure on top of the liquid wax 24, forcing it upward through the pipe 23 and out through the rectangular-shaped nozzle 17, whereby it will be thoroughly mixed with the air from the blower fan for spraying the floor in an even and uniform manner, which is very important.

It will be noticed that the end of the nozzle 17 is made rectangular in shape, as indicated by the numeral 30. It has been found, from actual experience, that this nozzle opening must be made rectangular for efficient operation, in order to obtain the best spraying results, and that the width of the nozzle opening should be between ten and forty thousandths (.010 and .040) of an inch.

Referring to Fig. 8, in which the interior construction of the conical, tubular, spray member 2 is constructed to receive the pipe 31, through which the liquid wax from the tubular member 7 passes to the nozzle member 17, in this construction, the rotary air, under pressure, from the fan 4 passes through the conical-shaped member 2, where it meets the liquid wax from the delivery end of the nozzle 17, at the point 32. The pipe 31, it will be noticed, is formed as an integral part of the helical blades 11, 12 and 13, and in this construction, the blades are attached to the ring members 33 and 34, permitting the pipe 31 and the blades to be inserted and removed as a unit. 35 is also a ring member, in which the pipe 36 is located.

Referring to Fig. 9, in which the tubular, or pipe member 37, has one end threaded for attachment to the tubular portion 38, which tubular portion is formed as a part of the helical blades 39, 40, 41 and 42, these blades, it will be noticed, are made much shorter and serve to impart a rotary motion to the air, under pressure, through the conical member 2. The opposite end of the pipe 37 is located in the ring, or spider member 43, to which the pipe 44 is connected that conveys the liquid wax.

Fig. 5 shows a modification, in which the tubular member 26 opens into the jar 25. 27 indicates an opening which communicates with the interior of the jar 25. When the device is in operation, the user places his finger, or thumb, over the tubular member 26. This creates a pressure in the jar 25 and forces the liquid wax from the jar to the nozzle 17, as described. When the finger is removed, the atmospheric air enters the jar, thus destroying the pressure and stopping the operation of the spraying device. The operator, can, therefore, by merely shutting off, or admitting the entrance of air into the jar 25, control the operation of the device, when in use.

Fig. 6 illustrates a hook 47 to receive the rubber tubing 7, which supplies liquid wax, when the jar 25 is not used.

The nozzle 17, it is to be understood, is made in different sizes, as shown in Figs. 3, 8, and 9, and located near to, or away from the openings 15 and 32. It may be inserted and removed from the part 38, or tube 31, with a sliding fit.

Referring to Fig. 11, which shows a section 48 of the ribbonlike liquid wax, as it leaves the rectangular-shaped opening 30 of the nozzle member 17, which is moving in the direction of the arrow 49; the circular currents of air, as they leave the openings 15 or 32, are indicated by the arrows 50. These air currents as shown, will strike the opposite and flat sides of the ribbonlike substance and break it up into finely divided particles.

What I claim is:—

1. A spraying device of the kind described comprising, a tubular member having a conical-shaped end portion with an exit opening in the apex thereof, means for forcing air under pressure through the said member, means for imparting circular motion to the air in its passage through the member, means for supplying a liquid waxlike substance near the open end of the tubular member, and means for producing a long, narrow rectangular-shaped formation to the waxlike substance as it leaves the supply means adjacent said open end of the tubular member, whereby the combined effect of the circular currents of air and the long, narrow and rectangular-shaped stream of liquid waxlike substance will produce a finely divided spray effect of the waxlike substance and the air, as described.

2. In a spraying apparatus for the purpose described, a tubular member formed with a contracted circular opening in one end, means for forcing air through the member, means in the said member for imparting a circular motion to the air as it leaves the contracted circular opening, means for delivering a liquid waxlike substance to the contracted circular opening and in a ribbonlike formation, whereby the circular currents of air, as they come in contact with the ribbonlike formation of the liquid waxlike substance, will break up said substance into finely divided particles.

3. In a spraying apparatus, a tubular member having an exit opening in an end thereof, means for forcing air through the same, means for imparting circular motion to the air as it leaves the opening, means for detachably securing a receptacle containing the substance to be sprayed to the tubular member, means for conveying the said

substance to the interior of the tubular member and adjacent the exit opening, in a ribbonlike formation.

4. In a spraying apparatus, a tubular member having an exit opening axially disposed in an end thereof, means for forcing air through the same, means for imparting circular motion to the air as it leaves the opening, means for detachably securing a receptacle containing the substance to be sprayed to the tubular member, means for conveying the said substance to a location in the interior of the tubular member adjacent the exit opening and centrally disposed relative thereto, in a ribbonlike formation, and air vent means for controlling the delivery of the said substance.

5. A liquid spraying apparatus comprising, in combination, a tubular member having a circular exit opening axially disposed in an end thereof, means for forcing air under pressure through the exit opening, means adjacent the exit opening for imparting rotary motion to the air as it leaves the opening, a long, narrow nozzle having a rectangular-shaped opening located on the axis of said tubular member between the exit opening and the means for imparting circular motion to the air, and means located in the tubular member for conveying the substance to be sprayed to the nozzle.

6. A spraying apparatus having in combination, a tubular member with a reducing taper-shaped exit end portion formed with a circular exit opening in the extreme end thereof, a plurality of helically-shaped members in the taper-shaped portion, a receptacle containing the substance to be sprayed and secured to the taper-shaped portion, means for conveying the said substance to the exit opening, a removable nozzle having a long, narrow opening through which said substance is conveyed to the said exit opening, means for forcing air through the tubular member and communicating means between the taper-shaped portion and the interior of the receptacle.

7. A spraying apparatus for the purpose described, comprising in combination, a tubular member having a tapered end portion reducing in diameter to a rounded snout portion, said portion being provided with a circular opening, means for forcing air through said tubular member, a tapered member in said end portion formed with a plurality of spiral fins for imparting a circular movement to the air when forced through said tapered end portion, said tapered member having an axial bore therein, a nozzle removably secured in said axial bore and provided with a long, narrow, slotlike discharge opening, said discharge opening being adjustably located adjacent the plane of said circular opening and on the same axis, and means for forcing a liquid through said axial bore for discharge through said nozzle.

8. The method of atomizing a liquid substance to be sprayed which consists in forcing air under pressure through a tapered nozzle reducing in diameter and terminating in a circular opening and provided with means for imparting a rotary motion to the formed cylinder of air and simultaneously projecting a liquid substance to be sprayed in a ribbonlike stream in the axis of the revolving cylindrical stream of air and in the direction of flow of the air.

EARL S. WARNER.