May 17, 1949. J. R. BURKE 2,470,601

DUST COLLECTING APPARATUS

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Fig. 1.

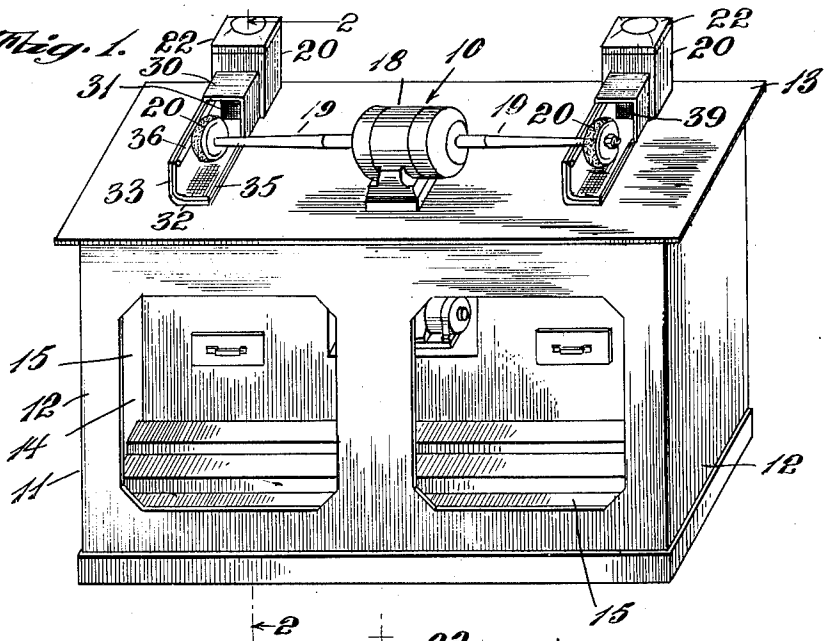


Fig. 2.

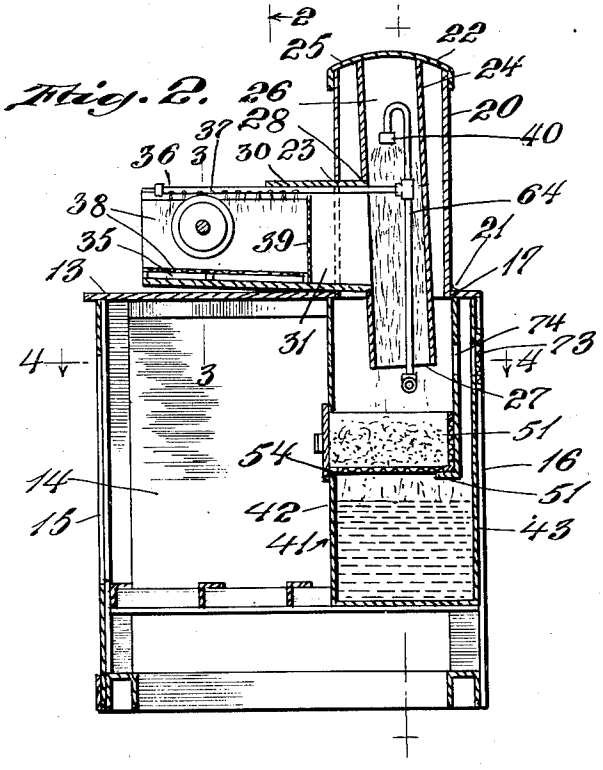
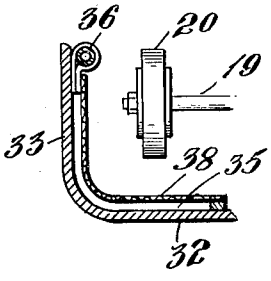


Fig. 3.



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Fig. 4.

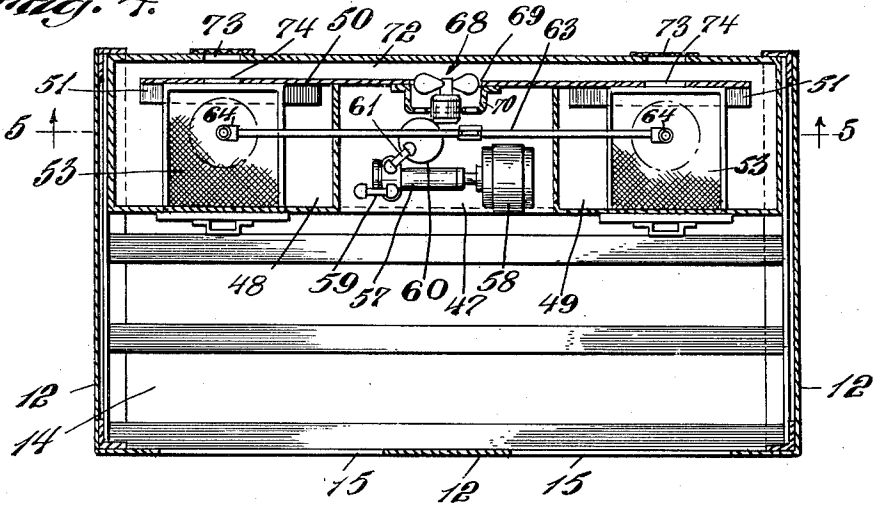
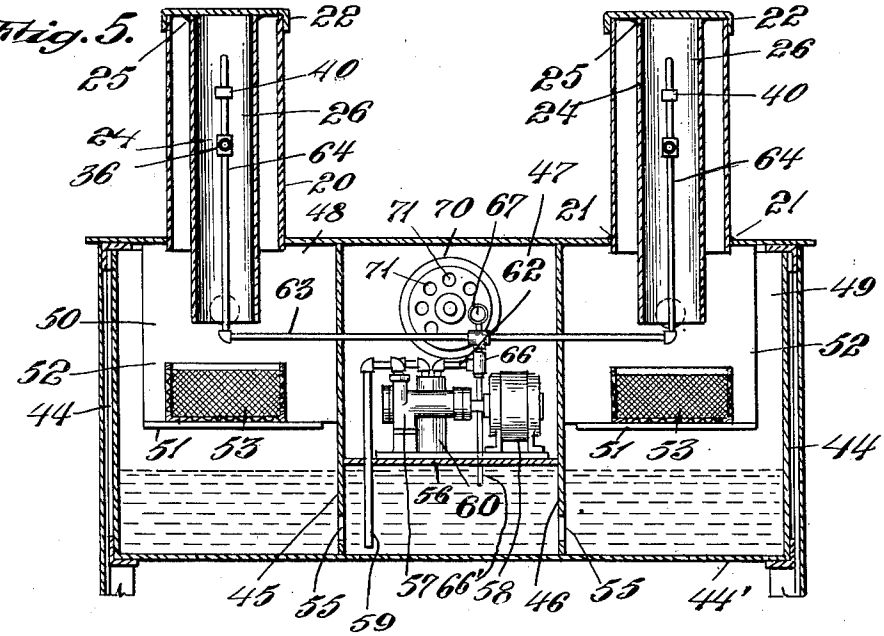


Fig. 5.



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DUST COLLECTING APPARATUS

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Application July 8, 1946, Serial No. 682,110

4 Claims. (Cl. 51—273)

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This invention relates to an apparatus and method for collecting dust, particularly an apparatus forming part of polishing units for collecting dust particles cast off by the polishing wheel.

Polishing apparatus of this general character of which I am familiar do not catch all the dust cast off by the polishing wheel and dust escapes and settles on the surrounding structures, on the clothes of the operator, which makes for unhealthy working conditions.

An object of the invention is to improve in general on dust collecting apparatus of this general type.

Another object of the invention is the provision of a dust collecting apparatus wherein the dust will be collected in a moistened condition.

Another object of the invention is the provision of a dust collecting apparatus wherein a suction force for collecting the dust will be generated by a liquid medium.

Another object of the invention is the provision of a dust collecting apparatus wherein the vehicle for carrying the dust to the collection location will be a liquid medium.

Another object of the invention is the provision of a dust collecting apparatus in which a liquid in a vapor spray under pressure will be utilized for generating a suction force for collecting the dust cast off by a polishing wheel.

Another object of the invention is the provision of a polishing unit provided with a dust collecting apparatus wherein such dust which may be cast off the wheel at locations beyond the influence of the inlet of the suction duct will be directed thereto by a liquid medium.

Another object of the invention is the provision of a polishing unit provided with a dust collecting apparatus wherein air will be expelled therefrom in a filtered condition.

Another object of the invention is the provision of a polishing unit provided with a dust collecting apparatus wherein the dust particles collected will be removed from the apparatus in a a moistened condition.

Another object of the invention is the provision of an apparatus of this character which can be manufactured at comparatively low cost of production and which will be durable and satisfactory in use.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

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Fig. 1 is a perspective view of a polishing unit provided with a dust collecting apparatus embodying my invention;

Fig. 2 is a sectional view taken substantially along line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken along line 3—3 of Fig. 2 showing a fragmental portion of the dust collecting apparatus in relation to the polishing wheel;

Fig. 4 is a sectional view taken along lines 4—4 of Fig. 2; and

Fig. 5 is a side elevational sectional view taken along lines 5—5 of Fig. 4.

In carrying out my invention as applied to a polishing unit, such as is employed in the jewelry, silverware, metalcraft, plastic, wood, leather, rubber, and other industries, for polishing, finishing or "burning down" operation required in the manufacture of a product, I mount on the supporting structure of the unit a suction duct. The duct is provided with inlet and outlet openings and from the inlet opening a passage may extend to adjacent the polishing wheel. This passage is in line with the wheel so as to receive therein the particles of dust cast off by the wheel by centrifugal force. In one end of the duct I provide for discharging a liquid vapor spray to pass the inlet opening to absorb the duct particles cast in the duct and carry the dust particles to the outlet opening. The pressure under which the spray is discharged is such as to provide a moving column of liquid vapor in the duct of a sufficient density and force so as to generate a suction force about the opening and in the passage so as to aid in drawing the dust particles within the duct. The dust is carried through the duct to a filter receptacle positioned adjacent the outlet of the duct. The liquid is filtered from the dust and returned to a reservoir which I mount within the frame of the polishing unit. The filter receptacle may be removed from the apparatus with the dust collected therein in a wet condition that the same may be disposed without danger of escaping in the air. I also provide means in the form of a trough which is positioned beneath the polishing wheel to catch such dust which may fall short of the influence of the suction duct. The trough is arranged to be inclined toward the inlet opening and a flow of liquid is provided for carrying the dust to the opening in the duct.

Referring to the drawings for a more detailed description of the invention, 10 designates generally a polishing unit having a supporting structure in the form of a cabinet 11 which may be

of any approved construction and may consist of a plurality of walls 12 suitably interconnected to form a rigid unit for supporting a table top 13 and providing a chamber 14 with openings 15 in the front thereof and opened at the rear as at 16. The table top is provided with spaced openings 17 adjacent the rear edge thereof.

The polishing unit comprises an electric motor 18, the shaft of which is provided with spindles 19. To the ends of these spindles are mounted polishing wheels 20. These polishing wheels may be of any form suitable for the particular operation to be performed thereby and may be of an abrasive character or cloth charged with abrasive material. This assembly is mounted on the table top 13 with the spindles extending generally parallel to the front longitudinal edge of the table top and in line with openings 17. Each polishing wheel is provided with a dust collecting unit which in the present arrangement comprises a tubular support 20 that is mounted to extend above the table top 13 in a general upright position with the lower end of the support received in the opening 17 and there secured in position in any approved manner such as by a weld 21 extending about the abutting edges of the opening 17 and the walls of the support 20. The support is opened at the lower end and closed at the upper end by a cap 22. The support is also provided with an opening 23 in the front wall thereof at a location to be in line with the polishing wheel.

To the inner side of the cap 22 a cylindrical member 24 is fastened such as by a weld 25 and depends within the support at a slight inclination to the vertical with the lower end thereof extending beneath the table top 13. The member 24 provides a suction duct 26 which is opened at the lower end providing an outlet 27 and closed at the upper end by the cap 22. The duct 26 is also provided with an inlet opening 28 which is positioned to be in line with the opening 23. A conduit 30 extends from the inlet 28 through the opening 23 to adjacent the wheel 20 and provides a close passage 31 extending from adjacent the wheel to the inlet 28.

The lower wall 32 and a side wall 33 of the conduit 30 are continued to extend beyond the polishing wheel 20 with the wall 32 extending beneath the wheel 20 and inclined toward the inlet 28 providing a trough 35 extending from beneath the wheel 20 to the inlet 28 for catching such dust particles which may be dropped from the work, or cast by the wheel short of the inlet 28. Secured to the upper edge portion of the wall 33 is a manifold 36 which is provided with a plurality of spaced openings 37 positioned so as to discharge a film of liquid along the wall 33 to flow into the trough 35 and convey to the inlet 28 such dust particles which may lodge upon the trough 35. A screen 38 is position over the trough 35 and a screen 39 is positioned in the passageway 31 so as to prevent any articles which are worked upon which may be dropped by the operator from being conveyed into the suction duct 26.

The medium which I employ for generating a suction force in the duct 26 and passage 31 and to carry dust particles to the outlet 27 is in the form of a spray of vaporized liquid which is discharged into the duct 26 at the upper end thereof under sufficient pressure and density so as to provide the desired result. Accordingly a vaporizing device 40 is mounted in the upper end portion of the duct 26 and by conduits provided by proper piping to be later described, liquid is carried from a reservoir to the vaporizing device 40.

Within the compartment 14 I mount a tank-like structure designated generally 41 having front wall 42, rear wall 43, side walls 44, bottom wall 44' and closed at the upper end by the table top 13. This tank-like structure is divided by walls 45, 46 so as to provide a central compartment 47, side compartments 48, 49. The side compartments are further divided into an upper and lower chamber by means of a plate 50 which extends lengthwise of the cabinet and is spaced from the rear wall, 43. This plate 50 extends short of the bottom of the tank and the lower end portions of the plate are turned inwardly so as to provide ledges 51. The upper chambers provide processing chambers 52 in which is provided a filter receptacle 53 in the form of removable drawers. The walls of the receptacle are of a mesh material so as to permit the seeping of liquid therethrough. Each receptacle 53 is supported at the front thereof on the edges of openings 54 provided in the front walls 42 and through which the receptacles extend. The rear end of the receptacles are supported on the ledges 51. The receptacles are positioned at locations so as to receive the discharge of dust from the duct 26. The lower portion 41 of the tank provides a reservoir for the fluid and is separated by extensions of the walls 45, 46. These walls 45, 46 have openings 55 spaced from the bottom wall 41' which permits the free flow of fluid from one portion of the reservoir to another, this arrangement also provides settling chambers for such grit and dust which may escape from the receptacle 53 into the reservoir.

The middle compartment has a bottom wall 56 which mounts the pump for forcing liquid to the vaporizing heads. This pump 57 may be of any suitable manufacture which is capable of providing the necessary pressure required. That herein shown is actuated by means of a directly connected electric motor 58. The pump is provided with the usual inlet and outlet ports and liquid is drawn from the central division of the reservoir to the pump by means of piping 59. From the pump, the liquid is passed into a filter device 60 by means of pipe connections 61 and from the filter the liquid is directed through piping 62 to the main line 63 from which branch conduits may lead to each vaporizing device which the polishing unit may be provided. In the instant case, there are two polishing wheels and consequently two vaporizing heads. Accordingly, a pipe 64 extends into each from the main line suction duct 26. To the end of the pipes 64, the vaporizing heads 40 are attached. The manifold 36 may be of any of various forms, that in the instant case is shown in the form of a pipe which extends to the pipe 64 and is connected thereto such as by means of a T connection.

It will be apparent that when the pump is actuated the liquid will be pumped from the reservoir through the filter, and to the vaporizing heads where the fluid will be discharged in a vapor spray form. The pressure utilized may be within a range of 40 to 75 pounds' pressure and this pressure is controlled by means of the valve 66 positioned in the piping 62. The valve may be of the relief type adjustable to control pressures within this range and bypasses by a conduit 66' to the reservoir. A pressure gage

67 may be positioned in the main line 63 to indicate the working pressure in the line.

In order to expel the air entering into the chamber 14 through the suction duct 26, a motor driven fan 68 is provided. The fan is mounted so as to be positioned within an opening 69 in the rear wall 50 opposite the central compartment by means of a supporting member 70 which may be welded or otherwise secured in place. The member 70 is provided with a plurality of openings 71 for the free flow of air to the fan. The action of this fan causes a flow of air in the space 72 between the plate 50 and the rear wall 43 of the tank and out through screen openings 73 in the rear wall 43. The plate 50 is provided with openings 74 positioned opposite openings 73.

In the operation of the apparatus, dust particles will be cast off from the wheel by centrifugal force into the path of the moving vapor spray in the suction duct 26 and will be carried thereby into the receptacle 53 which will permit the liquid to seep through the mesh walls thereof into the reservoir. The force and density of the spray passing the inlet 28 will also generate a suction force about the opening and in the passage 31 and aid in drawing within the duct 20 such particles of dust cast off by the wheel short of the inlet 28. The flow of liquid from the manifold 36 will also provide a vehicle for carrying such dust particles into the suction duct 26 which may drop into the trough 35.

It will be apparent that I have provided a dust collecting apparatus in which the dust collected is moistened so as to prevent its ready escape into the atmosphere and in which dust may be removed from the apparatus in a moistened condition so as to prevent its escape from the receptacle in the disposing of the same.

I claim:

1. In a dust collecting apparatus for a polishing unit comprising an abrading wheel, a generally vertical suction duct extending at substantially right angles to the path of movement of the dust cast off from said wheel by centrifugal force, said duct having inlet and outlet openings therein with the inlet opening positioned in a side wall thereof opposite said wheel, means at the upper end portion of said duct for directing and discharging a liquid under pressure in said duct to pass said inlet opening in a spray, said inlet opening being positioned in the path of movement of said dust to receive therethrough dust cast off by the polishing wheel tangential thereof to be intercepted by the flow of the spray at substantial right angles to the path of travel of the dust cast into said duct.

2. In combination with a polishing wheel, a generally horizontal table top for supporting said wheel in spaced relation therewith and inwardly of the edges thereof, a generally upright suction duct extending at substantially right angles to the path of movement of the dust cast off from said wheel by centrifugal force, said duct extending above and below said table top and having inlet and outlet openings therein with the inlet opening positioned in a side wall thereof facing said wheel at a location on said wall to be above the table top and in line with said wheel for passing therethrough into said duct, dust cast off tangential from said wheel by centrifugal force, a nozzle positioned in the upper end portion of said duct for discharging and directing a liquid under pressure into said duct to pass said opening in a spray at substantially right angles to the path of travel of the dust through said inlet opening to intercept and carry therewith the dust to said discharge opening.

3. A polishing apparatus comprising a cabinet having a top wall providing a table top, a polishing wheel mounted on said table top in spaced relation therewith a distance sufficient to permit the work-piece to be applied to the wheel from beneath the same, means for rotating said wheel, a generally upright suction duct extending above said table top at substantially right angles to the path of movement of the dust cast off from said wheel by centrifugal force, said duct being closed at the upper end thereof and opening through said table top, an inlet opening in said duct in a wall thereof facing said wheel and at a location in said wall to be in line with the path of movement of the dust cast off from said wheel, means in the upper end portion of said duct for discharging and directing a liquid under pressure into said duct and against the walls thereof to pass said opening in a spray at substantially right angles to the path of the dust cast through said opening to carry therewith to the discharge opening dust cast into said duct.

4. A polishing apparatus comprising a cabinet having a top wall providing a table top, a polishing wheel mounted on said table top in spaced relation therewith a distance sufficient to permit the work-piece to engage the wheel from beneath the same, means for rotating said wheel, a generally upright suction duct extending above said table top at substantially right angles to the path of movement of the dust cast off from said wheel by centrifugal force, said duct being closed at the upper end thereof and passing through said table top, an inlet opening in said duct in a wall thereof facing said wheel and at a location in said wall to be in line with the path of movement of the dust cast off from said wheel, a nozzle positioned in the upper end portion of said duct for directing and discharging a liquid under pressure into said duct to pass said opening in a spray at substantially right angles to the path of the dust cast through said opening to carry therewith to the discharge opening dust cast into said duct, a reservoir within said cabinet, a removable filter receptacle extending into said reservoir at a location above the fluid level in said reservoir and beneath the discharge opening in said duct for receiving therein the dust discharged from said duct whereby to filter the fluid prior to passing into the reservoir, a pump positioned within said cabinet and conduits from said pump to said reservoir and said nozzle.

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