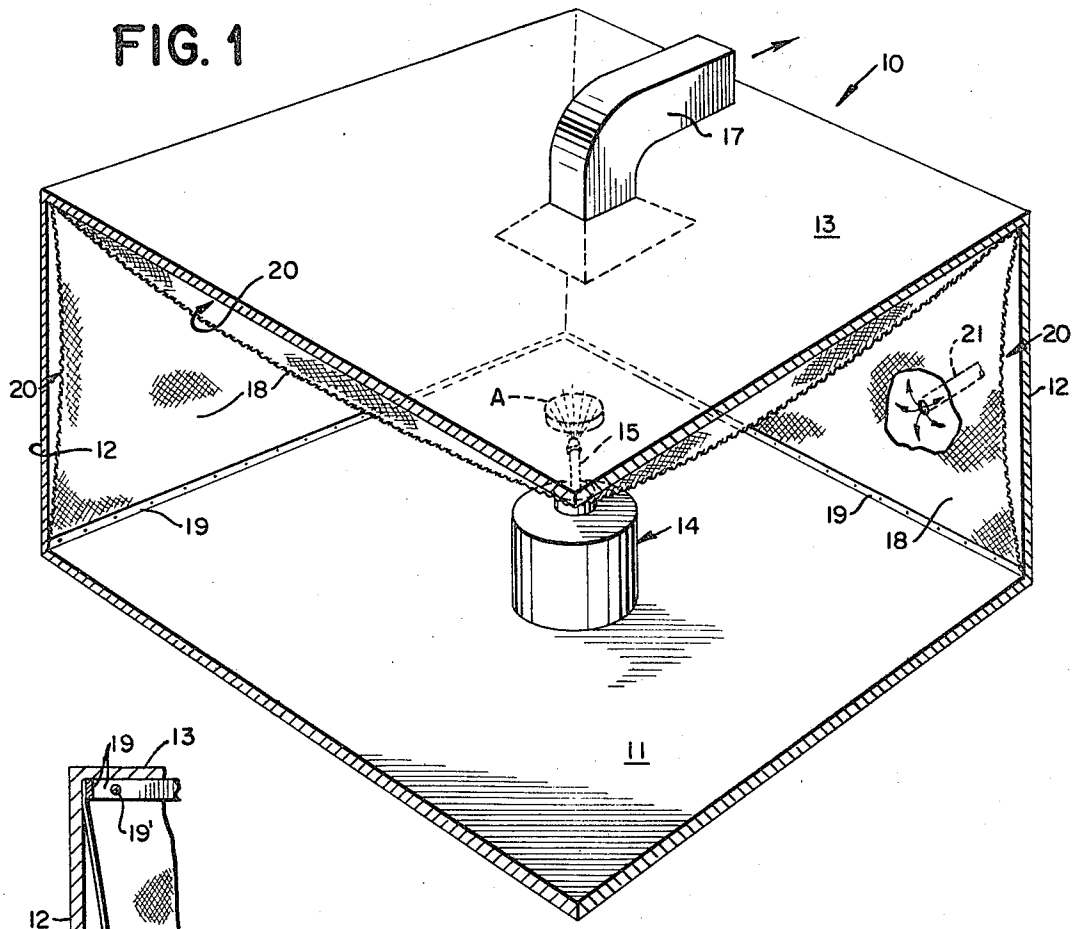
Feb. 24, 1970 R. F. WIGGINS 3,496,856

SELF-CLEANING SURFACES FOR PARTICLE-LADEN ATMOSPHERES

Filed May 7, 1968

FIG. 1



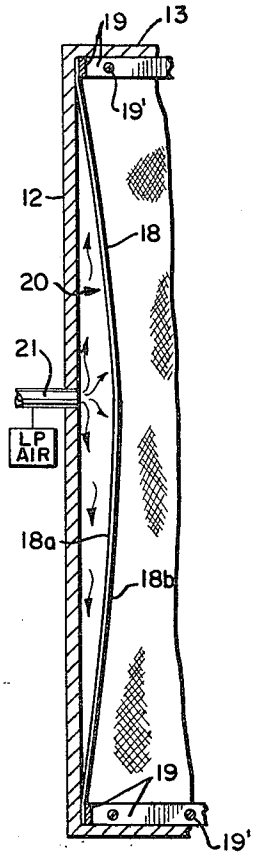


FIG. 2

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SELF-CLEANING SURFACES FOR PARTICLE-LADEN ATMOSPHERES

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Int. Cl. F24f 13/02
U.S. Cl. 98—33 6 Claims

ABSTRACT OF THE DISCLOSURE

The present disclosure relates to self-cleaning surfaces such as "non-drip" panels, curtains, and the like for use in spray booths and other areas where avoidance of problems attributable to accumulation of overspray and dripping is desired. The new self-cleaning or "non-drip" structures generally comprise a dry, porous static boundary, such as ordinary sailcloth, which has one surface exposed to the spray particle-laden atmosphere and the other surface subjected to a continuous flow of pressurized air. A dynamic boundary layer of permeating air is established at the exposed side of the porous boundary, which dynamic boundary layer is effective in preventing the deposition of sufficient spray particles on the exposed surface of the boundary to form drippable drops. The "non-drip" structures may assume the form of an entire wall or entire ceiling of a spray booth, or they may be limited to a relatively small unit area of a spray booth, or even to a unit area of spray equipment (whether in a booth or not) for use in combatting and eliminating contamination and dripping problems.

BACKGROUND OF THE INVENTION

In the coating of products by spray techniques, electrostatic, pneumatic, or otherwise, it is the major objective of the spray coater to deposit an absolutely uniform coating free of streaks, drops, or other imperfections. While in certain applications one or more of these types of imperfections may be tolerated or unnoticed, many product applications require an absolutely uniform layer of coating material to be applied, and there is a critical requirement that the applied coating be free of "drip marks" i.e., the irregularities in a coating occasioned by drops of accumulated spray material which have been deposited on a workpiece by falling from a surface of the spray booth.

Therefore, it is an object of the present invention to provide spray booth surfaces which are effectively "drip free" and non-contaminating of uniformly sprayed work surfaces. It is still another object of the invention to provide spray booth surfaces which are self-cleaning and which will contribute to the overall cleanliness of a spray booth.

SUMMARY OF THE INVENTION

The provision of drip free or self-cleaning surfaces in a spray booth or the like, may be effected in accordance with the principles of the present invention by lining the walls and ceiling of a spray booth with porous boundary forming layers, such as conventional sailcloth, i.e., a heavy canvas or duck fabric normally used for sails, tents, etc. More specifically, the sailcloth is arranged such that the inner surfaces thereof constitute at least a portion of a closed plenum chamber. The circulation of pressurized air through the chamber prevents the accumulation of drip forming spray particles on the surfaces of the sailcloth exposed within the spray booth and subjected to the spray filled atmosphere. Enough of the pressurized air

permeates the cloth boundary to establish eddy currents at the exposed surfaces, which currents prevent the deposition of sufficient spray particles thereupon to form drippable drops. As will be appreciated, the new arrangement may be aptly characterized as self-cleaning as well as drip free.

DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention and a more complete appreciation of the attendant advantages thereof, reference should be made to the following detailed description taken in conjunction with the accompanying drawings, in which

FIG. 1 is a perspective view of a paint booth, including non-drip wall surfaces, embodying the principles of the present invention; and

FIG. 2 is a cross-sectional view showing details of construction of the new and improved drip-free and self-cleaning surfaces of a spray chamber.

DESCRIPTION OF THE INVENTION

Referring to FIG. 1, the drip-free, self-cleaning surfaces of the present invention are incorporated in conventional spray booths or spray chambers **10**. A typical booth includes a floor **11**, side walls **12**, and a ceiling **13**, and has at least one spray station **14** at which articles A are sprayed with atomized coatings of spray material by a spray gun **15**. An exhaust duct **17** is provided to vent the spray-laden atmosphere of the booth, and, advantageously, a conveyor system (not shown) may be employed to transport the articles A into and out of the spray booth.

As will be understood, there exists in any booth considerable amounts of overspray (atomized spray particles) which are not deposited on the workpiece. Regardless of the efficiency of the exhaust system, this overspray tends to accumulate on booth wall surfaces, especially a ceiling surface, and droplets of spray material tend to build up and eventually drip off the surface to contaminate the booth or, worse yet, to form drip marks on the articles being coated.

In accordance with the principles of the invention, the surface areas of a spray booth, upon which overspray tends to accumulate and form drops, are provided with non-drip, self-cleaning auxiliary surfaces. More specifically, and as shown in FIG. 2, each non-drip surface is a dry porous layer **18**, advantageously fabricated from sailcloth which is secured to the booth wall by mounting strips **19** and screws **19'** or other suitable fasteners, to define a collapsed plenum chamber **20** therewith. As shown in the illustrated embodiment, the chambers **20** are collapsible and cover the entire wall and ceiling surfaces of the booth, but the chambers may be of rigid construction and/or they may be limited to smaller surface areas when desired or found necessary. In any event, the plenum chambers **20** are provided by a pneumatic supply tube **21** with a constant flow of air under predetermined pressure. The air effectively inflates the plenum chamber **20** and is delivered in sufficient quantity and under sufficient enough pressure to the internal surfaces **18***a* of the porous boundary layer **18** to steadily permeate therethrough to the external or exposed surfaces **18***b*. In accordance with the principles of the invention, the steadily permeating air will establish a "dynamic boundary layer" which will tend to prevent the accumulation of overspray particles on the static boundary layer **18**. Thus the permeating air (which need only be under low pressure to permeate sailcloth) effectively renders the surfaces **18***b* self-cleaning by repelling spray particles therefrom and eliminates any possibility of droplets of spray forming and subsequently dripping on

articles A. As will be understood, the spray-laden or misty atmosphere of the booth is itself constantly vented through existing exhaust systems such as the duct **17**.

The non-drip, self-cleaning surfaces **18** of the invention may be employed in those areas of any spray booths in which droplet buildup occurs. Since air circulation is not the same from booth to booth due to many factors, the specific placement of the new and improved non-drip surfaces in a particular booth will be on an empirical basis.

As will be appreciated, the utilization of the non-drip, self-cleaning surfaces of the present invention will greatly alleviate problems of contamination of spray booth surfaces and the marring of sprayed surfaces by drip marks.

It should be understood that the specific form of the non-drip, self-cleaning surfaces herein illustrated and described is intended to be representative only, as certain variations may be made therein without departing from the clear teachings of the disclosure. For example, the new surfaces may assume the form of spray gun enclosures or surfaces to protect spray apparatus within or without a spray booth. Likewise, the new surfaces may be used in atmospheres laden with particles other than spray particles, e.g., dust. Accordingly, reference should be made to the following appended claims in determining the full scope of the invention.

What is claimed is:

1. A self-cleaning, drip-free surface comprising:

(a) a supporting structure having a continuous air impervious surface,

(b) a porous boundary layer having inner and outer surfaces,

(c) means uniting said boundary layer with said air impervious surface to define a closed plenum chamber, and

(d) means for introducing a gas at greater than atmospheric pressure into said plenum chamber;

(e) whereby a steady flow of gas from the plenum chamber to the outer surface of said porous boundary layer is established.

2. A self-cleaning, drip-free surface in accordance with claim **1**, in which:

(a) said boundary layer is supported loosely relative to said structure and said chamber is thereby inflatable,

(b) said layer is adapted to be expanded upon the inflation of said chamber.

3. A drip-free, self-cleaning surface in accordance with claim **1**, in which:

(a) said porous layer comprises a woven fabric.

4. A drip-free, self cleaning surface in accordance with claim **3**, in which:

(a) said fabric is sailcloth.

5. A wall structure, comprising:

(a) a porous panel means forming an inside wall surface of a booth or the like, and

(b) air supply means to provide and maintain air at greater than atmospheric pressure on the outside surface of said porous panel means,

(c) said air supply and said porous panel means being so related as to provide a general inward flow of air through the porous panel to minimize the deposition on said wall of spray material.

6. The wall structure of claim **5**, in which:

(a) said porous panel means comprises a flexible, fabric-like material.

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