

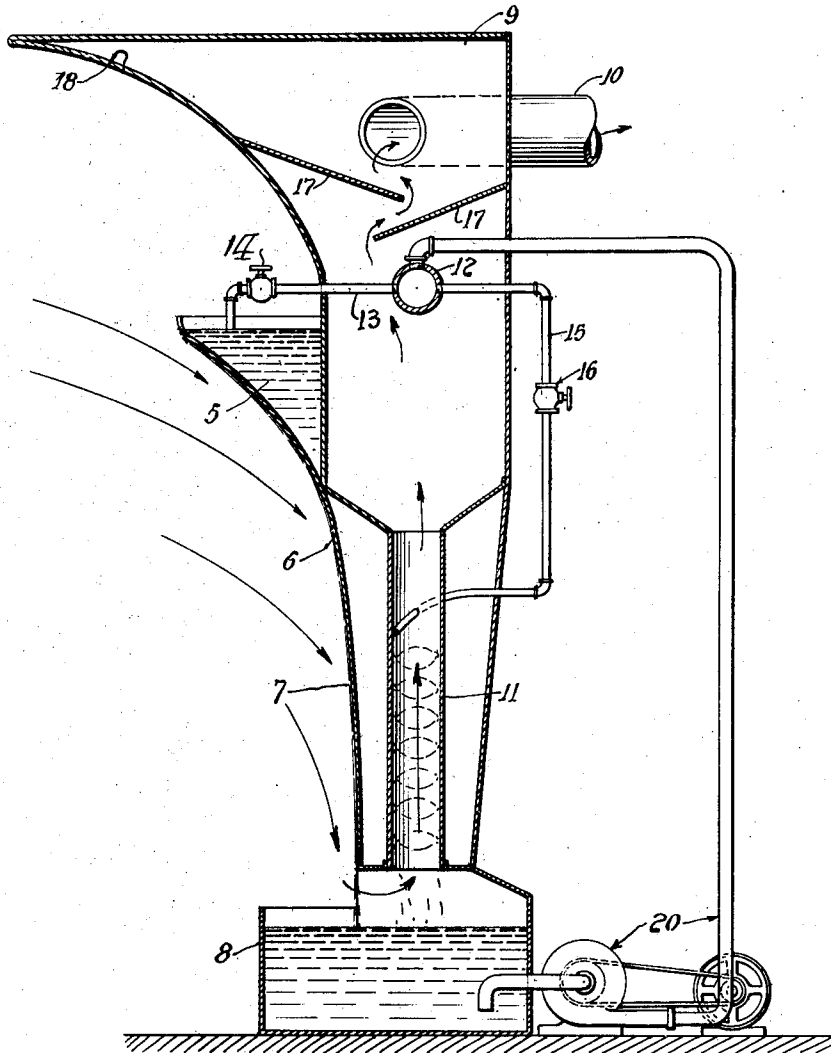
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METHOD OF TREATING WASTE SPRAY PARTICLES

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METHOD OF TREATING WASTE SPRAY PARTICLES

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This invention relates to improvements in methods of treating waste spray particles which occur when spraying articles with so-called synthetic material, lacquers, paints and the like and it consists of the matters hereinafter described and more particularly pointed out in the appended claims.

In the automotive, refrigerating cabinet and similar industries, synthetics, lacquers, paint and similar coating materials are now applied by spraying operations. In such operations many of the atomized particles do not find lodgment upon the piece of work being sprayed and such particles not only expose the operators to the danger of injurious inhalations of air laden with flying particles, but they also constitute a fire hazard and are often lost as waste.

In some instances, spraying booths are so made that the atomized particles beyond the work are intercepted by a running film or curtain of water, by which said particles are carried to a receiving trough, certain air currents being established to carry said particles away from the operators into engagement with the water film or curtain. While such methods have improved the conditions under which the operators work and have reduced fire hazards, other objectionable results still obtain to a large extent.

The waste spray particles seem to have a natural affinity or attraction for each other. This action is, I believe, the natural coalescing action of said particles even when intercepted by a water film or curtain or when submerged in water in the collecting trough. The result is that some of the synthetic material, lacquer, paint or like particles intercepted by the water, collect as a substantially homogeneous mass in the bottom of the collecting trough. It also adheres to the trough and is difficult to remove. Some of the particles adhere to the various parts of the spray booth, with which they come in contact, such as the tubes, suction chambers, filters, nozzles and the like. The result is that frequent cleaning is necessary. This is not only a slow laborious and generally messy task, but it requires taking the booth out of service with attending operating losses and inconvenience.

One of the objects of the present invention is to provide a method of treating such atomized waste particles so that they cannot coalesce and thereby unite to cling as a mass to the surfaces of the booth equipment they usually engage, whereby said particles may not only be more conveniently collected but whereby the booth

equipment may be maintained in a cleaner condition for a greater period of time.

Another object of the invention is to provide a method of this kind whereby it is possible more easily to collect the waste atomized particles for easy and safe disposal or for recovery for future use, when such recovery is desired.

A further object of the invention is to provide a method of this kind whereby the waste atomized particles are treated in a manner to provide a relatively tough coating or skin thereon which does not readily break down in the relative bombardment of the particles with each other and with surfaces defining the paths of movement through a spray booth equipment so that the coalescence of said particles is reduced to minimum, if not entirely eliminated to assure the collection of said particles as substantially flocculent mass.

Again, it is an object of the invention to provide a water-like liquid for use in spray booth equipment to provide the waste particle absorbing film or curtain and which shall be of such character as to prevent to a great degree, the coalescence of said particles.

The above mentioned objects of the invention, as well as others together with the several advantages thereof will more fully appear as the specification proceeds.

In the drawing, the single figure illustrates a transverse vertical sectional view through a conventional spray booth by which it is possible to carry out the improved method in accordance with the invention.

In the specification and claims the term "waste particles" means the spray material which does not adhere to the article being sprayed. The term "atomized" means the finely divided material of the form usually projected from the spray gun or device.

In general, the improved method contemplates treating the waste atomized particles to provide a film, coating or covering to most, if not all, of said particles so that the particles cannot coalesce. It is preferable that the film coating or covering be relatively tough so that the same will not readily break in the bombardment of the particles with each other or with those walls of the booth defining the path of movement of said particles. The particles mentioned may be treated at any point beyond the work being operated upon, but to permit the invention to be employed in connection with booth equipment now in use, the water film or curtain which intercepts the particles and the associated collecting

trough are chosen as the most convenient place.

When the invention is carried out at the water curtain, the water supply for such a curtain is treated with a suitable coagulant. Thus, upon interception of the waste atomized particles, by the water, coagulation takes place, the particles being enveloped within somewhat gelatinous-like globules. These globules substantially maintain their characteristics so that when collected, they form a somewhat granular mass or floc. A quantity of a coagulant is added to the water supply for said curtain. I have determined that aluminum salt of any classification is satisfactorily effective.

A number of different coagulants may be used although some are preferable to others. Sodium aluminate is a very satisfactory reagent because its inherent alkalinity ensures the formation of aluminum hydroxide, the principal coagulating material. Aluminum sulphate (alum) may be used, but in that event, it is generally necessary to add an alkali so that aluminum hydroxide will be formed. Aluminum hydroxide may, likewise, be employed and in fact all aluminum salts in the presence of necessary alkali. Iron sulphate and copper sulphate with the necessary added alkali may likewise be employed. Also, any of the heavy metal coagulants that will form a hydroxide may be used. When sodium aluminate is the reagent used, the floc or spongy mass formed is of such density that it floats on the water of the collecting trough and may, therefore, be very easily removed with the entrapped waste spray particles. When the heavy metal coagulants are used, it is likely that the flocculent mass will be precipitated and that then it will be necessary to remove the same together with the entrapped waste particles from the bottom of the water trough.

The sodium aluminate may be applied directly to the water supply of the booth, either as a liquid sodium aluminate plus excess sodium hydroxide or as dry or pulverized sodium aluminate. With a spray booth equipment having a supply tank of substantially 600 gallon capacity for water, 1 gallon of 32% liquid sodium aluminate containing about 8% excess caustic soda properties is added. The same may be agitated by hand or otherwise to form a working admixture.

The above is an initial dosage. Every 24 hours sodium aluminate is added, say about three quarts, or such an amount as is sufficient to maintain an alkalinity equivalent to from $1/300$ to $1/100$ N. in the 600 gallon batch.

In the spray booth equipment or apparatus, the treated water is contained in a tank 5, the front wall of which is formed by a downwardly curving panel 6 upon which treated water from the tank 5 trickles as a film or curtain 7 to drip into a collecting trough 8. Associated with and above the water tank is a suction chamber 9 connected by a duct 10 leading to an exhaust fan not shown. A plurality of riser tubes 11 (only one of which appears in the drawing) communicate at the top end with the chamber 9 and terminate a short distance above the top of the level of the contents of the trough 8.

Extending longitudinally of the compartment or chamber 9 is a manifold pipe 12, operatively connected by a suitable piping and pump 20 with the trough. Pipes 13 lead off from the manifold 12 to discharge into the supply tank 5, a valve 14 in said pipes controlling the flow of treated water to the tank. Other pipes 15 each with a valve 16 therein, lead off from the mani-

fold 12 to open tangentially into an associated riser tube by means of a suitable jet or nozzle. By reason of the jet or nozzle for each pipe 15 leading into the riser tube as mentioned, the treated water is discharged as a fine spray into said tube and is caused to spiral around the inside of the riser and then discharge out of the bottom thereof into the trough 8. In the chamber 9 above the manifold pipe 12 are baffles 17 that incline downwardly toward the free edge. The upper portion of that wall of the chamber above the tank is curved to form a hoodlike projection 18 that overhangs the treated water in the tank 5.

Assume that the exhaust fan to which the duct 10 is connected, is in operation and that the pump 20 associated with the trough 8 and manifold 12 is in operation. Under these conditions, the treated water delivered into the tank 5 overflows the front lip thereof so that the treated water runs down the wall 6 as a film or curtain 7 into the trough 8. At this time treated water is also discharged as a spiral stream down the riser pipe and out of its bottom to discharge into the trough 8. By reason of the sub-atmospheric pressure in the chamber 9, air currents are established toward the panel 6 which flow down the water film thereon under the bottom edge thereof, through the water film between said edge and the liquid level in the trough and up through the riser tubes 11 to the chamber 9 and out the duct 10. The path of such air current is indicated by the arrows in the drawing.

Such flying atomized particles that do not find lodgment on the work being sprayed, are entrained by said air currents and are intercepted by the water film or curtain and discharged into the collecting trough. In this action, it is believed, that said particles become covered with a layer of aluminum hydroxide, calcium carbonate or magnesium oxide according to the reagent used, the two last mentioned elements being normally precipitated from the water by the sodium hydroxide which is a part of the sodium aluminate or which may be added in addition to the sodium aluminate.

When the particles collect in the trough, they are more or less granular or flocculent but of a non-sticky character so that they do not adhere together as a mass nor do they adhere, to any appreciable extent, to the metallic surfaces of the spray booth equipment.

By the use of the water treated as described, for intercepting the flying waste atomized particles, the spray booth equipment, including pump, lines, valves, nozzles, etc. is kept in a much cleaner condition, and a greater amount of particles are collected for recovery when it is so desired to recover said particles. The improved method which permits use of the present type apparatus for this purpose, is indeed inexpensive to carry out and saves time and expense losses heretofore necessary under prior practice.

While in describing the invention I have referred in detail to certain steps in carrying out the method, as well as to the sequence thereof along with certain proportional percentages in the make up of the treated water, the same is to be considered only in the illustrative sense so that I do not wish to be limited thereto except as may be specifically set forth in the appended claims.

I claim as my invention:

1. The method of treating the waste particles developed in a spraying operation utilizing synthetic paint type materials, paints, lacquers, and the like, which consists in bringing the particle

laden air into contact with a scrubbing water containing sufficient aluminum salt and an alkali sufficient only to produce a substantially insoluble metallic compound, whereby coalescence of the waste particles is prevented and coagulation is caused.

2. The method of treating the waste particles developed in a spraying operation utilizing synthetic paint type materials, paints, lacquers, and the like, which consists in bringing the particle laden air into contact with a scrubbing water containing sufficient sodium aluminate in order to form sufficient metallic hydroxide, whereby

coalescence of the waste particles is prevented and coagulation is caused.

3. The method of treating the waste particles developed in a spraying operation utilizing synthetic paint type materials, paints, lacquers, and the like, which consists in bringing the particle laden air into contact with a scrubbing water containing a salt of a metal forming an insoluble hydroxide and alkali in an amount sufficient to form said insoluble hydroxide, whereby coalescence of the waste particles is prevented and coagulation is caused.

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