Nov. 7, 1950 H. A. WELDON 2,529,466

METHOD OF BLENDING DDT

Filed Feb. 19, 1946

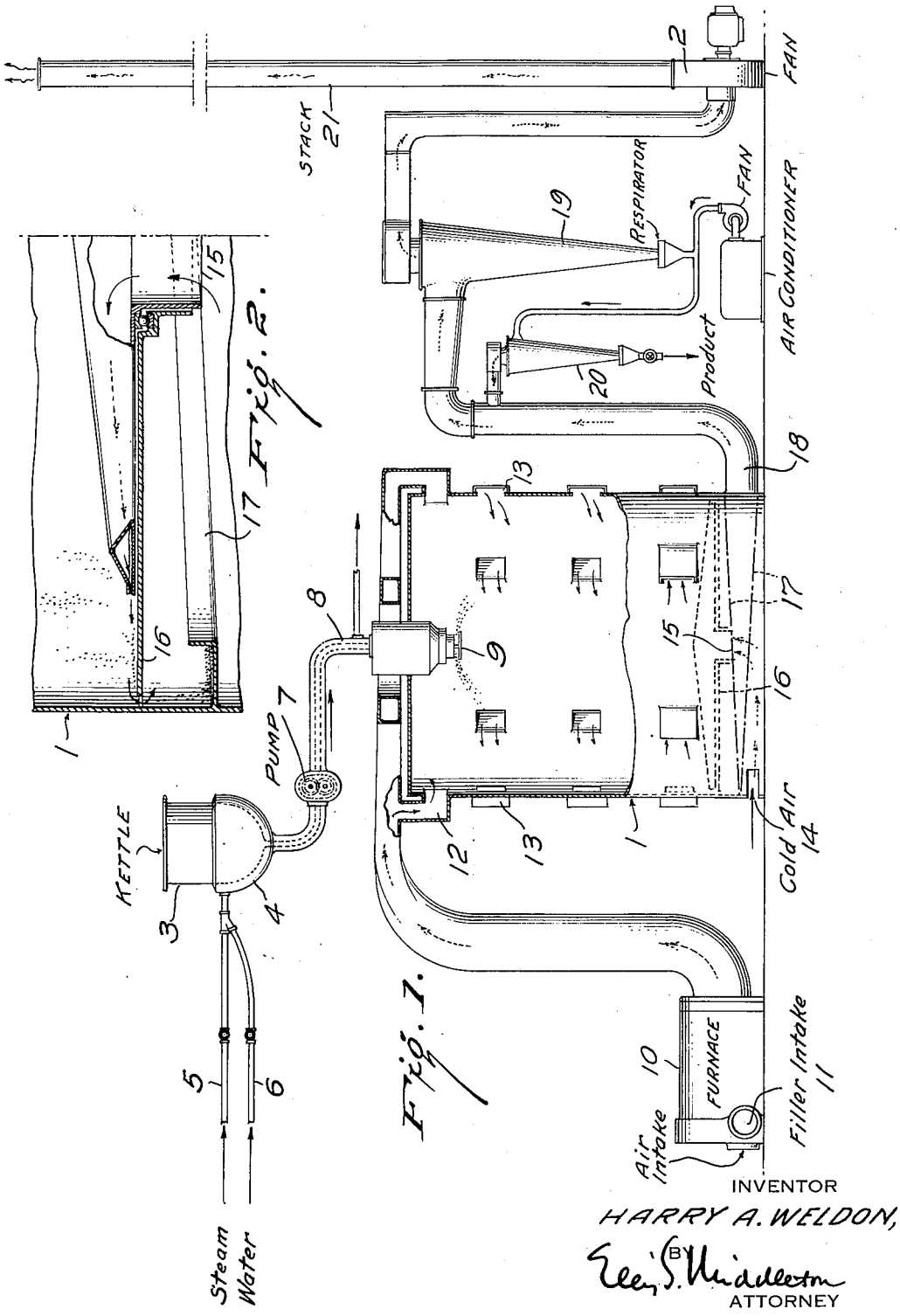


Fig. 1.

Fig. 2.

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Patented Nov. 7, 1950

2,529,466

UNITED STATES PATENT OFFICE

2,529,466

METHOD OF BLENDING DDT

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Application February 19, 1946, Serial No. 648,784

1 Claim. (Cl. 167—42)

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The present invention relates to a method of size reduction and blending two or more materials, and is particularly concerned with the preparation of a dry free-flowing mixture containing two or more finely divided substances.

In the blending for instance of commercial grade α,α - di(p-chlorophenyl) - β,β,β - trichlorethane, hereinafter referred to as DDT, with an inert filler such as diatomaceous earth, silica flour, wood flour, kieselguhr, ground walnut shells, clay, talc and the like, special problems are presented in view of the waxy nature of the DDT. Ordinarily speaking, a commercial grade of DDT is produced as a DDT solidified cake which is then broken up into lumps and finally reduced to a finely divided condition through various types of grinders. This is in itself a troublesome operation which usually involves chilling in order to render the DDT more friable and subject to subdivision. In one or more places along the line, the solid diluent is introduced so that eventually the materials are ground together not only to reduce them to a proper state of subdivision but to cause a thorough and complete blending of the two ingredients and distribution of the required content of the toxic agent through the mass.

The present invention constitutes an improvement over this heretofore difficult operation and contemplates the subdividing of a liquid material into an atmosphere laden with the finely divided diluent, preferably in suspension under such conditions that where the material is molten, the molten particles are solidified while they themselves are suspended making contact at the time of or before solidification with the suspended diluent particles, the mixture then being recovered. As a consequence, the present proposal avoids the difficult operation of grinding and blending as heretofore practiced. The eventual size of the solidified particles is, of course, a function of the atomization while in the molten state, the viscosity of the molten material (which is itself dependent upon the temperature of the melt), the rate of feed of the substances being blended or several of them. The percentage of each ingredient in the final mixture will, of course, be dependent upon the ratio of feed of the materials to the blending apparatus and may be varied at will. Where the material is a liquid solution in suspension, the air or gas atmosphere may be heated so as to simultaneously produce subdivided particles and to vaporize the liquid.

The invention further contemplates the novel

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combination, arrangement and construction of parts and the steps of the method more fully hereinafter described and as shown in the accompanying drawing.

In the drawing,

Fig. 1 is a diagrammatic layout of an apparatus for carrying out the present invention, and

Fig. 2 is an enlarged elevation partly in section, showing the bottom of the blender device immediately adjacent the take-off.

Referring now with particularity to the embodiment shown, a blending chamber is shown at 1 which may be generally constructed along the form of a standard type of spray drying unit, usually cylindrical in nature. Air or other inert gas is made to move through the apparatus from left to right by means of the usual exhaust fan 2.

In cases where it is desirable to blend a material which can be melted with a solid material which can be suspended in the air or other gas passing through the apparatus, the material may be melted in kettle 3 provided with jacket 4 and supplied with steam through pipe 5 and/or water through pipe 6 so as to control the temperature in the melting kettle. A pump 7 delivers the melted material from the kettle through an inlet pipe 8 to a distributing wheel 9 within the blender which is caused to rotate by a motor, not shown, in the ordinary manner. It is important, of course, that this material be molten at the time of atomization.

Air or other inert gas which moves through the apparatus by reason of fan 2 may be made to enter through the usual furnace 10 which in the present instance does not have its burner operating. A finely divided filler such as above described may be introduced into the incoming stream of air or gas through the intake 11. As a result, the filler is suspended in the flowing gases which are delivered to the head 12 of the blender 1 in a tangential manner so as to cause a swirling action and to fill the interior of the blender with an atmosphere in which the filler is suspended. Additional air or other gas may be introduced into the blender 1 as desired through tangential ports 13. Where it is desired, the air or other gas may be pre-cooled in order to lend a more rapid chilling effect to the molten material thrown off by the atomizing wheel 9.

The size of the particles thrown off by the atomizing wheel 9 will be determined by the temperature of the melted material fed from kettle 3 and the size and speed of rotation of the wheel. It will be apparent that as the molten material

is atomized, it will immediately contact the suspended solid particles in the atmosphere of the blender and solidification will take place more or less instantaneously. If contact is made between the molten particles and the filler before solidification, there will be a desirable adhesion between the two which makes for a more efficient blending effect. At any rate, the mixture sweeps the cylindrical side of the blender and finds its way to the bottom of the apparatus. Here air through port 14 enters a central aperture 15 in the shelf 16 spaced from the cylindrical wall of the blender and causes the blended particles to drop down onto a spirally arranged shelf 17 which leads to the take-off pipe 18. From this point the blended particles are carried by the moving air through a primary dust collector 19 and a secondary collector 20, the final product being recovered from the bottom of the latter. The excess air, carrying very little dust, exits through the stack 21.

It has been found that such a device which is standard equipment in many respects lends itself admirably to the blending of materials capable of being melted and solid finely-divided filling materials capable of being suspended in the air passing through the apparatus. The process is particularly adapted for blending DDT with fillers such as above mentioned. By adjusting the rate of feed of the ingredients, a blended mixture may be obtained containing any desired ratio thereof. By varying the temperature of the melt at atomization and the speed of the atomizing wheel, the size of the solidified material may be controlled to a nicety, such size varying inversely with the temperature of the melt and the speed of the atomizing wheel.

Photomicrographs of blended DDT and silica flour show that solidification of the DDT can be made to take place after contact with the suspended filler. As a result, each particle of DDT carries its proportionate amount of filler adhered thereto. Such a blended mixture may be further diluted, if desired, with considerable ease and without the difficulties normally encountered where the DDT particles are in such a form as to exhibit their waxy characteristic.

It has been found that normally speaking molten materials so blended do not require refrigerated air to carry the filling material as one may operate sufficiently close to the solidification point that air or other gas at normal temperatures will cause sufficient chilling to insure solidification before the particles hit the walls of the atomizing chamber.

Where the material fed from the kettle 3 contains some water or moisture, this may be simultaneously removed with blending by operating the furnace which supplies heated air or gases to the blender, the filler being introduced into the air stream to the furnace or separately as desired.

The primary point of the invention is that size reduction and blending may be accomplished by contacting the two or more materials going to make up the mixture while in a state of suspension rather than to grind them together as is the usual procedure. Such a process is particularly adaptable to the blending of molten materials with suspended fine-divided particles.

Other materials may, of course, be introduced into the air stream with the filler such as wetting agents, dispersing agents, other toxic agents, combination of fillers, coloring matter and the like, all of which may be termed fillers.

Such a blending procedure is also applicable to the production of other free flowing mixtures such as the manufacture of catalysts, scouring powders, other insecticides, hormone dusts or the like and, in fact, any situation where it is advantageous to feed a fluid, either solution or molten, into a spray mechanism whether a specifically rotating wheel or not and to simultaneously feed dust into the air stream, hot or cold, which may also be the atomizing stream, to form an intimately mixed and blended product.

While the invention has been described with particular reference to specific embodiments, it is to be understood that it is not to be limited thereto but is to be construed broadly and restricted solely by the scope of the appended claim.

I claim:

A method of producing blended particles of a waxy solid and a finely divided solid diluent wherein each particle of the waxy solid is coated with particles of diluent which comprises melting the waxy solid, subdividing the molten material into a cooling zone and permitting it to fall therethrough as liquid drops, simultaneously introducing a cloud of finely divided solids into the cooling zone whereby the solids adhere to the surface of the drops due to the liquidity thereof and the waxy nature of the liquid material, abstracting heat from the zone and solidifying the waxy material, and collecting the composite particles of waxy material coated with solid particles of dust in which the waxy solid is α,α-di(p-chlorophenyl)-β,β,β-trichlorethane.

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