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METHOD OF AND APPARATUS FOR SPRAYING LIGHTWEIGHT FIBROUS AND GRANULAR PARTICLES

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2 Claim. (Cl. 302—49)

This invention relates to the method of and apparatus for spraying fibrous and granular materials, such as mineral wool, glass wool, rock wool, asbestos, paper, cotton linters, expanded mica and perlite and binding and other agents, onto a surface to be coated therewith.

Pursuant to the invention, the materials to be sprayed, which are light in weight, are delivered, through an air lock, directly to a straight pneumatic line for movement to a discharge member, such as a hose, for controlled discharge to the surface to be covered. The fibrous and granular materials are initially deposited in a hopper and metered therefrom into the pneumatic pressure line while preventing the escape of the pneumatic pressure medium into the hopper. The invention enables pneumatic spraying of such materials from a hopper source which may be located at a considerable distance from the surface to be coated thereby, the material being carried in a pneumatic stream and to the surface to be coated, without loss of pressure.

The invention has many advantages over methods heretofore used for coating surfaces, including the following: The feed rate is increased many times and loss of pressure is prevented; thus the invention permits the use of hose lengths in multiples of lengths feasible in conventional systems, permits the projection of the material to be sprayed to greater lengths (for walls) and heights (for ceilings) than attainable with prior equipment and methods; equipment embodying the invention may be operated at a fraction of the horse-power required in conventional procedures for the purpose. The use of metal parts which may wear out is obviated, and very little stress or strain in operation is encountered so that the procedure of the invention is essentially long lasting and foolproof in use and operation. The fibrous and granular materials to be sprayed are more gently handled so that they will not be broken, and better coverage is attained, resulting in a tighter texture and better adhesion of the coating material. Less dust, waste and droppings occur than in procedures heretofore used for the purpose.

Examples of practical procedures embodying the invention are described below and in the accompanying drawings; the invention is not limited thereto, but covers all other forms coming within the scope or purview of the disclosure herein.

In the drawings:

Fig. 1 is an elevational, partly fragmentary view of an apparatus embodying the invention,

Fig. 2 is a perspective view of a feeder unit which may be used in said apparatus,

Fig. 3 is an end elevational view of said feeder unit, with the cover thereof removed for the sake of clarity, taken at line 3—3 of Fig. 2,

Fig. 4 is a perspective view of a typical blower unit which may be employed in carrying out the invention, and

Fig. 5 is a fragmentary section [illegible] of a form of

hopper and associated parts which may be used in carrying out the invention.

The invention is adapted for the coating of surfaces such as beams, lathing, walls or ceilings, indicated schematically at 10 in Fig. 1, with lightweight fibrous and granular materials initially deposited in a hopper such as 11. Suitable binding agents, coloring agents, or other addatives may be mixed with the materials in the hopper 11 or prior to their being placed therein or mixed by simultaneously spraying binding and coloring materials through nozzles 27, 28, etc. as the material leaves hose 22. The hopper may be of any desired design and may be provided with a suitable device such as a screw, spiral, brush or other metering device, operated by hand or motor driven. The metering device shown in the drawing by way of example, is a screw, spiral, brush or the like 12 (Fig. 5) disposed in hopper 11 above the hopper opening 13, and which may be motor driven, metering the fibrous and granular materials from the hopper through the open, lower end 13 thereof, and thence through an aperture 19 of a casing member 14 (whose ends may be closed by plates 31, Fig. 3) and into the feeder 15 (Figs. 1 and 2). The feeder 15 may comprise, as shown in Fig. 2, a wheel having a plurality of elongated blades 16 radially arranged on a hub 18 so as to define a plurality of pockets 17 to receive the particles so metered through the aperture 19 between the hopper and feeder. The feeder may be of any other form desired; the pockets 17 are serially moved into line with the aperture 19 of casing 14 registered with the lower end 13 of hopper 11. The hub 18 of the feeder may be driven by suitable means such as a motor 20 (Fig. 3) to whose shaft the hub may be keyed.

On being thus rotated, the feeder pockets 17 will be serially filled and then serially moved past the aperture 19 of the member 14, out of registry therewith and into registry with a source of gas under pressure 21 (Figs. 1 and 2) located in position out of registry with aperture 19. The filled pockets 17, moving serially into alignment with the pneumatic line 21, the particles in said pockets are thus pneumatically borne therefrom and into a conveyor 22 aligned with the point of discharge of said gaseous stream from said pocket (Figs. 1 and 2). The conveyor 22 may be of any desired type for conveying the material to the surface to be coated. It may be flexible, if desired, for manipulation (as indicated in Fig. 1) by the operator to direct the gaseous stream so carrying said particles through a suitable discharge head 36 (Fig. 1) and toward the surface 10.

The pneumatic source 23 (Fig. 4) may be any appropriate means such as a fan, a compressor or a supercharger, which at one end 24, may be exposed to ambient air (where it is desired to use ambient air as the gaseous medium). The gas stream passes through the member 23 and is thereon compressed and blown through the pocket at 17 of the feeder 15 and, with the particles thus carried, moves through the conveyor 22 for projection onto the surface 10, Fig. 1. It will be appreciated that by the procedure above mentioned, an air lock is provided, preventing air from blowing back through the aperture 19 and into the hopper, and maintaining the pressure in the line. The lower end 13 of hopper 11 may simply register with aperture 19 of casing 14 as in Fig. 1 or (Fig. 5) the area of said lower end 13 of the hopper may be adjustable by use of suitable means, as [illegible] interposing a collar 32 between the lower end 13 of hopper 11 and the aperture 19 of casing 14, and providing said collar with an apertured plate 33 and slidably positioning a second apertured plate 34 through a bearing 35 on collar 32 and on the plate 33 so that, by reciprocating the plate 34 (as indicated by the arrow, Fig. 5) the [illegible]

tive opening between the lower end 13 of hopper 11 and the aperture 19 of casing 14 may be controlled. Metering is a function of the speed of rotation of No. 12, and the size of opening of 13. Variation in feed rate may be accomplished by varying speed of member 12 or varying size of opening 13.

The material may be moistened as it leaves the conveyor 22 or prior thereto by the provision of one or more suitable moistening nozzles, such as schematically shown at 27, 28 (Fig. 1) connected to suitable moistening sources, projecting moistening streams 29, 30 into the material on discharge from the conveyor 22. Said moistening nozzles might be disposed within the conveyor hose 22 instead of, or in addition to being located on the outside thereof, as shown in Fig. 1. The wetted mass is sprayed to surfaces, such as the surface 10 for the purpose of improving appearance, for structural purposes, for fireproofing, insulation, condensation control, acoustics, sound deadening, weatherproofing and for any other desired purpose.

I claim:

In an apparatus of the character described, in combination, a material feeding means including a cylindrical casing having an elongated aperture in the upper wall portion thereof and disposed in parallel relation to the axis of the casing, a circular plate removably secured to each end of the casing, a hub rotatably supported in said casing, a plurality of equi-angularly spaced blades projecting radially from said hub and extending substantially the full radius of said casing, a direct drive motor supported on one of said end plates for rotating said hub,

a pneumatic line communicating with said casing through one of said end plates, a conveyor longitudinally aligned with said pneumatic line and communicating with said casing through the other of said end plates, a hopper disposed above said casing and having an opening communicating with said elongated aperture in said casing, a material metering device in said hopper adjacent said opening comprising a rotatable hub having a plurality of equi-angularly spaced blades thereon, a slidable closure plate for said aperture in said casing, a pneumatic pump in communication with said pneumatic line, a material discharge nozzle on the end of said conveyor, and material moistening nozzles located adjacent the first mentioned nozzle.

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Fig. 1.

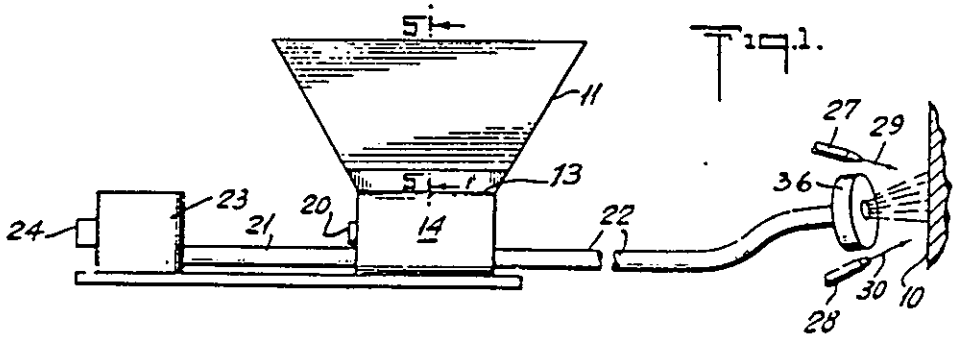


Fig. 2.

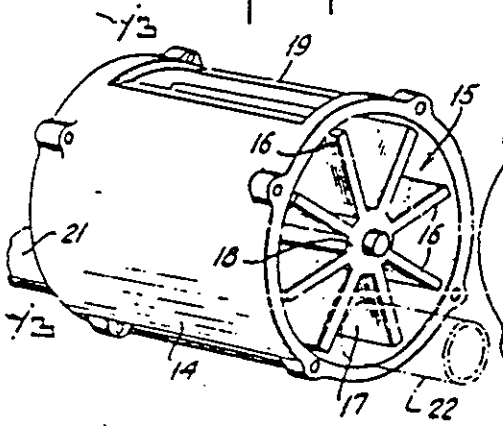


Fig. 3.

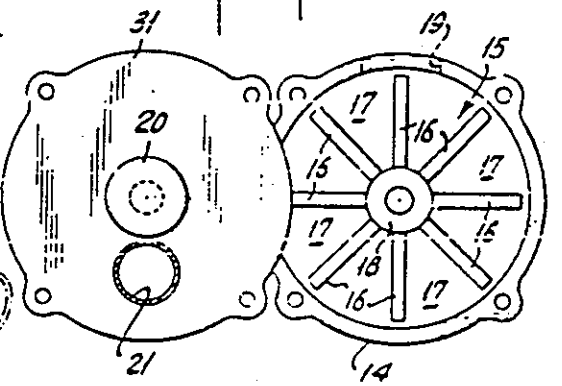


Fig. 4.

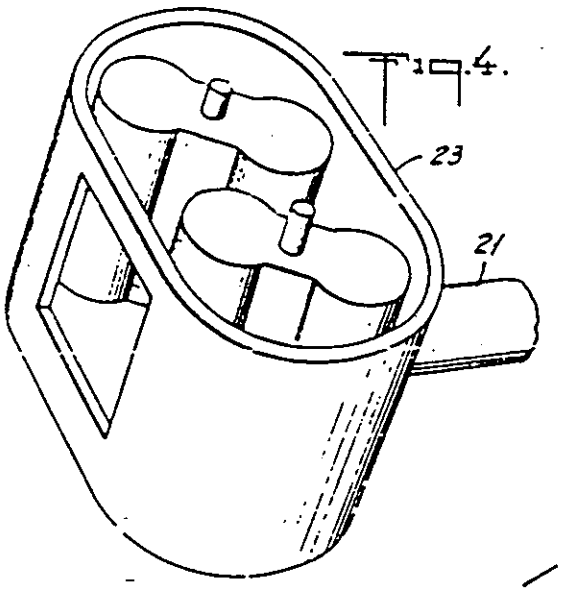
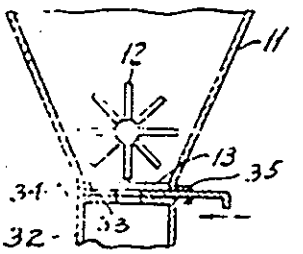


Fig. 5.



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