

March 16, 1937.

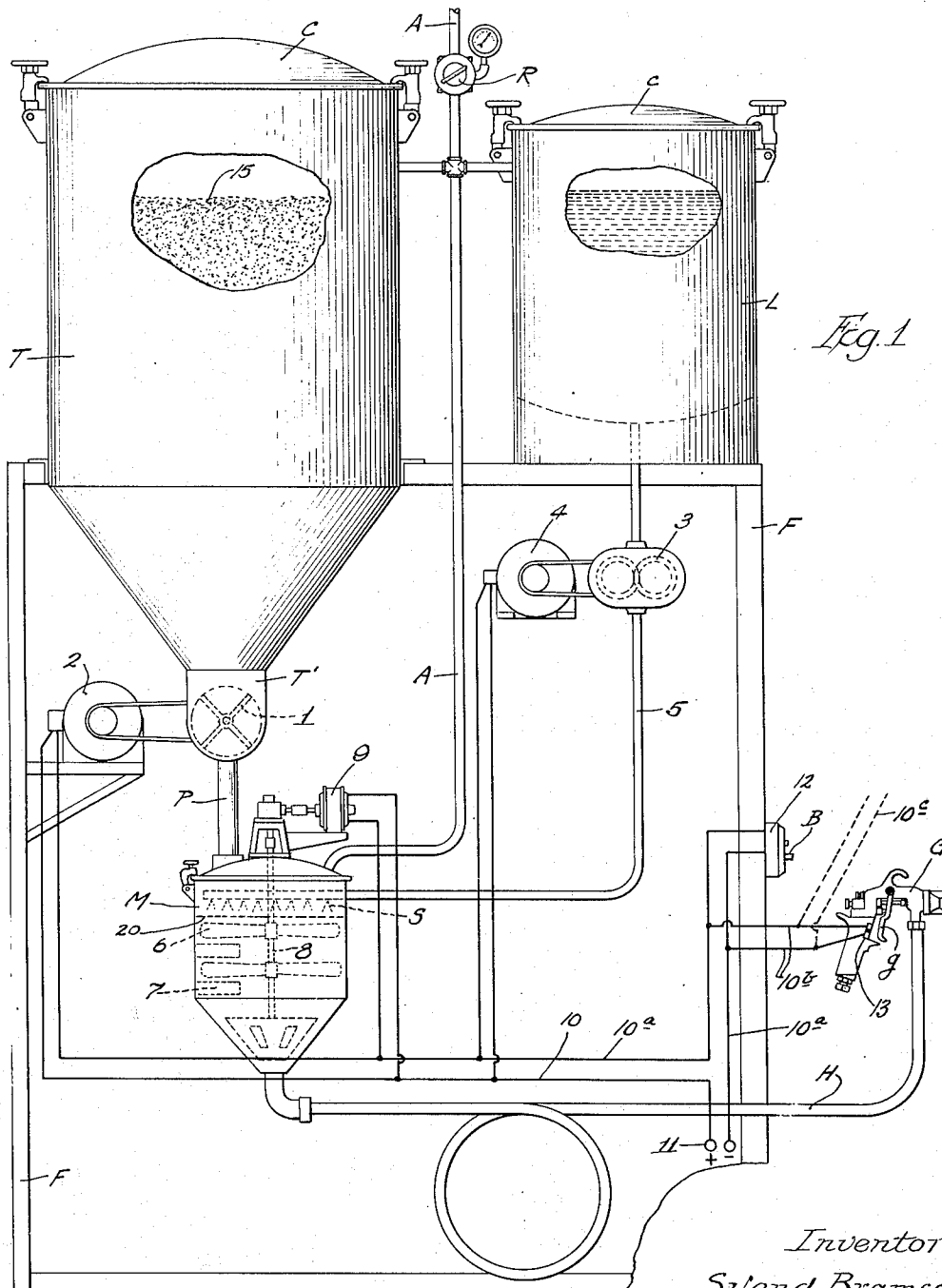
S. BRAMSEN

2,073,779

SPRAYING ADHESIVE COATED MATERIAL

Filed Nov. 27, 1935

2 Sheets-Sheet 1



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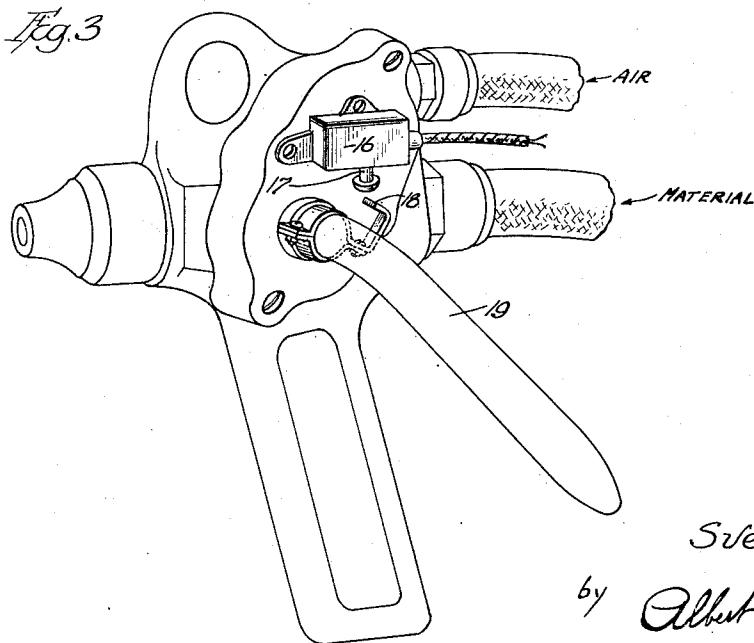
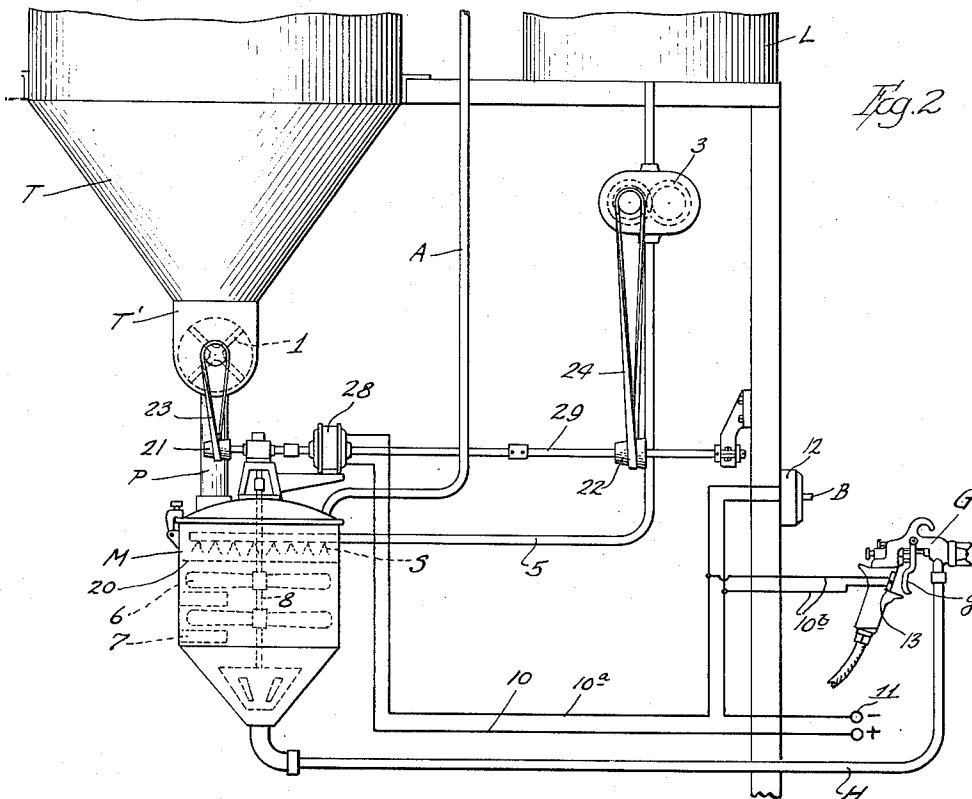
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UNITED STATES PATENT OFFICE

2,073,779

SPRAYING ADHESIVE-COATED MATERIAL

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Application November 27, 1935, Serial No. 51,763

15 Claims. (Cl. 91—45)

In its general objects, my invention relates to means for intermingling a liquid with a comminuted material in definite proportions and thereafter conjointly spraying the resulting mixture, and more particularly to a spraying installation of this class for surface-coating porous material with an adhesive or other binder.

When ground cork, asbestos, shredded paper or the like are used as a filling between the inner and outer walls in parts of a building, or in the hollow walls of an automobile, for either sound-deadening or heat-insulating purposes, it is important that the particles of such materials shall not be free to be packed down by jarring, or gradually packed down merely by their own weight. Consequently, it is already customary to use an adhesive liquid for binding the solid particles of material to one another and for also binding the walls to adjacent material particles, so as to prevent a relative displacement of the material particles after the filling is completed.

According to one of the heretofore customary procedures, this has been done by projecting separately formed sprays of the comminuted material and of the adhesive liquid with the aid of pneumatic spray appliances in such a manner that the material and liquid will intermingle after their discharge from the said appliances and before reaching the space which is to be filled. With this procedure, an undesirably large proportion of the adhesive liquid is projected between the particles of the sprayed solid material, and the coating of the particles is far from uniform, so that an excessive amount of the adhesive or other binder is required for insuring even a fairly stable filling.

As an alternative procedure, it has also been proposed to feed the comminuted material and the binder separately into a spray appliance of the general class of a spray gun, so as to mix the said material with the binder while within the gun. In practice, this has the objection that the usually irregular shapes and sizes of the solid material particles will prevent a uniform mixing of these particles with the binder, so that some of the material will issue without having an adhesive coating on it, while an excessive adhesive coating on other particles of the solid material will cause these to clog the gun. Moreover, neither of the just described procedures is economical for use with any gritty material (as for example, scraps of asbestos—when the spraying has to be done at some distance from the material supply tank) because a dry material of this nature will grind through the piping and likewise

will cause undue wear on the material passages of a spray gun.

When the sound-deadening material is absorbent—as for example, with ground cork—an undue absorption of the liquid binder by the cork while being mixed with the latter within a spray gun will fill an excessive proportion of the air spaces within the cork; thereby greatly reducing the sound-deadening and heat-insulating properties of that material, and also requiring an excessive proportion of the binder. To overcome these objections, it has heretofore been proposed to waterproof the particles of cork, shredded paper or the like first, but this in turn increases the expense undesirably.

My present invention aims to provide an apparatus which will effectively apply a surface-coating of the adhesive or other binder to the solid material while still leaving the internal air spaces of the material filled with air, thereby also causing this adhesive coating to act after the manner of a lubricant for enabling the material (even if this is asbestos or other porous mineral) to travel readily through ducts of considerable length without causing undue wear.

Furthermore, my invention aims to provide an apparatus which will insure an adequate surface-coating of the solid material before the start of the spraying operation, so as to maintain a predetermined proportioning of the adhesive or binder to the solid material throughout the spraying operation; which will automatically halt the feeding and the mixing of both the solid material and the binder whenever the spraying is interrupted; and which will permit an easy and speedy cleaning of the mixer, the pipe lines and the spray guns at the close of the day's or half-day's spraying time.

Moreover, my invention aims to provide an apparatus of the above recited characteristics which can readily be adjusted both as to the proportioning of the binding liquid to the material; and for maintaining a predetermined quantity of liquid in the mixer; which will prevent atmospheric air from reaching either the material or the liquid; and in which compressed air will propel the surface-coated material through the mixer and the discharge duct and through the associated spray guns.

Illustrative of the manner in which I accomplish the above recited objects, as well as more detailed objects,

Fig. 1 is a somewhat diagrammatic elevation of a spray apparatus embodying my invention, showing the discharge duct as connected to a

single spray gun, and showing the use of separate motors for measuring the material and the liquid binder into a mixer, and for agitating the resulting mixture within the mixer.

5 Fig. 2 is an elevation similar to a portion of Fig. 1, showing the use of a single motor connected directly to the agitator, and connected by independent variable speed drives to the two feed mechanisms.

10 Fig. 3 is an enlarged perspective view of a spray gun particularly suitable for use in spraying adhesive-coated material, the gun being equipped with a switch for connection to the corresponding circuit in Fig. 1 or Fig. 2.

15 In Fig. 1, the frame-work F supports both a material tank T and a liquid tank L at a considerable elevation above the casing M of a mixer, each of these tanks having a cover C sealed to it and having its upper portion connected to a pipe A to which compressed air is supplied through a pressure-regulator R. The material tank T has its lower portion T¹ formed for housing a metering dispenser 1 which measures the material supplied through a material pipe P into the mixer casing M, this dispenser being driven by an electric motor 2. A second metering dispenser 3 is disposed in a liquid pipe 5 leading from the bottom of the liquid tank L into the upper portion of the mixer, this dispenser being driven by a second electric motor 4.

The liquid pipe 5 desirably has its lower portion extending horizontally into the mixer casing M above the rotating paddles 6 which co-operate with the stationary paddles 7 for agitating the contents of the mixer. These paddles are fast upon an upright shaft 8 rotated by an electric motor 9, each of the said three motors being of an adjustable speed type and the three motors being connected in multiple to a two-wire circuit leading from terminals 11.

This circuit is arranged so that it is open when my spraying apparatus is idle, and so that it can be closed either for a predetermined short time interval by a manually started time switch 12 or by a circuit-closer 13 associated with a spray-gun G connected by a hose H to the bottom discharge outlet of the material tank M. The time switch may be of a commercial type in which a circuit between two terminals is closed by digitally pressing a button B, and in which either a clockwork or a synchronous motor automatically opens the circuit after a predetermined time interval.

In starting my apparatus with no material or liquid in the mixer casing, the user first presses the switch button B, thereby causing all three of the motors, so as to actuate both the measured feeding of material 15 from the material tank and liquid L from the liquid tank to the mixer, and also to rotate the agitator so that the material particles will rub upon each other to distribute the liquid coating upon them. When the operator is informed by the click of the time switch during its opening of the switch (or visually by seeing the button B snap out again) that the agitator has effected the needed minimum filling and stirring of the mixer, he operates the spray gun G by retracting the usual gun-actuating member g, thus closing the current-supply circuit so as to start all three of the said motors again.

Whenever the user thereafter operates the gun, the two metering dispensers 1 and 3 feed material and liquid respectively, at the rates for which the speeds of the corresponding motors are

adjusted, to the mixer M and the agitator 8 likewise operates (at the rate for which the motor 9 was adjusted) for distributing the liquid on the granules of material before they are forced through the hose H to the spray gun. Thus, the timed switch only needs to be actuated at the beginning of each spraying period, and its time adjustment can be such (as for example a quarter of a minute) that the adhesive is not yet adequately distributed over the upper layers of granules in the mixer, since these will be further agitated before their discharge for spreading the adhesive over them.

With independent speed-regulatable motors used for driving the two measuring dispensers and the agitator of the mixer, the speeds of these motors can readily be adjusted to a feeding rate sufficient for permitting the material granules to be surface-coated, although the quantity of liquid is insufficient for having the liquid soak so deeply into the particles as to crowd air out of a large portion of the air spaces within these particles. This liquid surface-coating on the material then acts like a lubricant in enabling the material to slide freely through the hose and through the usual material passage of the spray gun, the discharge of which gun can then consist almost entirely of material particles coated with little more than a film of the liquid.

In practice, the proportions of my apparatus and the feeding rates of the two metering dispensers are desirably adjusted so that the level 20 of the material will remain below the discharge outlets of the liquid sprays S, so that the agitator continually rotates the material under the row of sprays.

By thus distributing upon the material particles, such as granules of cork, an amount of adhesive merely sufficient for insuring a surface-coating of these granules, I not only avoid the use of an excessive quantity of the adhesive but also can leave the greater part of the interior chambers in the cork filled with air so as to retain the heat-insulating and sound-deadening effect of this air. Moreover, by thus limiting the quantity of adhesive affixed to each granule of cork, I avoid a swelling of the cork granules which might otherwise cause these to jam the material passage of the gun and also of the hose H when the operation of the gun is temporarily halted. Consequently, when the supply of compressed air is shut off at the end of each working period, a detaching of the hose H from the mixer and from the gun will allow the residual contents of the latter to flow out through the hose, and both the mixer casing and the hose can thereafter be flushed out with a suitable liquid.

By using sealed pressure tanks and a sealed mixer, as shown in Fig. 1, I also avoid a contamination of both the material and the liquid by moisture or impurities in the air around the apparatus. Moreover, a gas other than air (as for example, carbon dioxide) can be used in place of the compressed air if the adhesive or other binder is such as would be affected by air.

Owing to the decided increase in the readiness with which most particles of porous material will slide through any duct or passage when these particles are film-coated with liquid, my apparatus also permits the spraying of larger particles than would otherwise be feasible with a given spray gun. In practice, I desirably employ a spray gun which has an axially straight material passage extending entirely through it, such as the one disclosed in my copending application

#19,779, filed May 4, 1935 on a Spray gun for asphalt or the like. With such a gun, a spring-opened switch 16 can readily be fastened to an exterior gun part, as shown in Fig. 3, with the movable circuit-closing member 17 disposed in the path of a finger 18 fastened to the actuating handle 19 of the gun.

However, many changes from the heretofore described construction and arrangement of my apparatus may obviously be made without departing either from the spirit of my invention or from the appended claims. For example, the needed adjustments in the relative rate of operation of the material-metering dispenser, the liquid-metering dispenser and the agitator of the mixer can be obtained with the use of a single motor, as shown in Fig. 2. In this figure, the motor 28 for driving the agitator has a shaft 29 carrying cone pulleys 21 and 22 connected by belts 23 and 24 respectively to cone-pulleys associated with the material dispenser 1 and the liquid dispenser 3.

Thus connected, the speeds of the two dispensers can be varied independently by shifting the corresponding belts in the manner for which tapering belt pulleys are commonly designed, and the rate at which the entire system operates can be varied (according to the nature of the material and liquid, and also according to the needed spraying capacity) by using a motor 28 which includes a variable speed reducing gearing.

So also, while Figs. 1 and 2 each show only a single spray gun, it should be obvious without separate picturing that a plurality of such guns could be connected to the same hose or other discharge duct, each additional gun having its circuit-closing switch connected in multiple with the circuit wires shown at 10b in Fig. 1 as leading to the there illustrated gun, as for example by the wires 10c shown in dotted lines in that figure.

Moreover, while my here disclosed apparatus is particularly suitable for coating material granules with a liquid adhesive and thereafter immediately spraying the coated granules, this apparatus could obviously be employed also for coating material particles with other liquids—as for example with a waterproofing liquid—and delivering these into a container instead of projecting them by means of a spray device.

I claim as my invention:

1. An apparatus for supplying adhesive-coated and comminuted solid material to a spray device, comprising a mixer casing sealed against the entry of atmospheric air and having its lower portion connected to the spray device; an agitator within the said casing; means also sealed against the entry of atmospheric air for feeding both material and a liquid adhesive into the upper portion of the said casing, the said means being adjustable to effect the said feeding at such relative rates that the fed adhesive suffices only for surface-coating the particles of the fed material; means driving the agitator; and means for supplying a compressed gas to the upper portion of the said mixer casing for forcing the resulting adhesive-coated particles of material out of the said casing and into the spray device.

2. An apparatus as per claim 1, including means for adjusting the relative rates of the feeding of the material, the feeding of the binder, and the speed of the agitator.

3. An apparatus as per claim 1, including a material container and an adhesive container from which the material and the adhesive are

respectively fed to the mixer casing, and means for maintaining the interior of the said two containers under the same gaseous pressure as that of the mixer casing.

4. A system for supplying adhesive coated particles of solid material, comprising: a mixer, an agitator disposed in the mixer, a material-containing tank and an adhesive-containing tank both supported at higher elevation than the mixer; means connected to the upper portions of the mixer and of both of the said tanks for maintaining the said upper portions under gaseous pressure; two ducts respectively leading from the bottom of the said two tanks to the upper portion of the mixer; two measuring dispensers operatively disposed respectively in the said two ducts; an outlet duct connected to the bottom of the mixer, and conjointly operable means for driving the agitator and the two measuring dispensers; the said driving means being adjustable to vary the relative speed of the agitator and the dispensers, so as to vary the extent to which the said particles are coated with adhesive while passing through the mixer.

5. A system as per claim 4, including a spray appliance connected to the said outlet duct, and in which the gaseous pressure in the two tanks and in the mixer affords sole means for forcing the material and adhesive through the outlet duct and into the spray appliance.

6. An apparatus for spraying adhesive-coated particles of material, comprising a spray appliance, a duct leading to the said appliance, a mixer including a casing having its outlet connected to the said duct, and an agitator within the said casing; a material-containing tank and an adhesive-containing tank both connected to the upper portion of the mixing tank, two measuring dispensers respectively interposed between the two tanks and the mixer; conjointly operable means for actuating the agitator and the two dispensers at predetermined relative rates, and control means operatively interposed between the spray appliance and the said conjointly operable means for halting the actuation of the agitator and the dispensers when the spray appliance is not being actuated.

7. A system as per claim 4, including means within the mixer for discharging the adhesive supplied to the mixer casing in the form of downwardly directed sprays within the said mixer casing.

8. An apparatus for spraying adhesive-coated particles of material, comprising a spray appliance, a duct leading to the said appliance, a mixer including a casing having its outlet connected to the said duct, and an agitator within the said casing; a material-containing tank and an adhesive-containing tank both connected to the upper portion of the mixer casing, two measuring dispensers respectively interposed between the two tanks and the mixer; conjointly operable means for actuating the agitator and the two dispensers at predetermined relative rates, and means for maintaining the upper portions of the two tanks and of the casing of the mixer under a gaseous pressure sufficient for forcing the said particles out of the mixer casing and through both the said duct and the spray appliance after these particles have been coated with adhesive while in the mixer casing.

9. An apparatus as per claim 8, in which the spraying appliance includes a manually movable discharge-controlling means, and in which the said automatic halting means comprise instru-

mentalities associated with the said manually movable means of the spray appliance for starting and halting of the said conjointly operable means in response respectively to discharge-opening and discharge-closing movements of the said manually movable means.

10. An apparatus for feeding comminuted material and a liquid respectively from a material container and a liquid container into a mixer which includes an agitator and thereafter through a pipe line to a spray-appliance, comprising means for maintaining the interior of both containers and of the mixer under gaseous pressure; motor-driven means for operating the agitator and for measuring suitably proportioned quantities of material and liquid respectively from the said containers into the mixer; jointly controllable circuits leading to the said motor-driven means; manually startable means for initially closing the said circuits and for automatically opening the said circuits after a predetermined lapse of time; and means mounted upon and responsive to the actuation of the spray appliance for closing the said circuits only during each actuation of the spray appliance.

11. An apparatus for feeding comminuted material and a liquid respectively from a material container and a liquid container into the casing of a mixer which houses an agitator and thereafter through a pipe line to a spray-appliance, comprising means for maintaining the interior of both containers and of the mixer under gaseous pressure; motor-driven means for operating the agitator and for measuring suitably proportioned quantities of material and liquid respectively from the said containers into the mixer; jointly controllable circuits leading to the said motor-driven means; and two switches disposed for independently controlling the supply of current to the said circuits, one switch being a manually startable time switch arranged for shutting off the supply of current after a predetermined time interval, and the other switch being associated with the spray appliance and arranged for maintaining a supply of current only during the periods of operation of the spray appliance.

12. An apparatus for surface-coating particles of material with a liquid, comprising a mixer casing having a discharge outlet in its lower portion; an agitator within the mixer casing; a material container connected to the upper portion of the mixer casing; a liquid container; a liquid pipe leading from the liquid container into the upper portion of the mixer casing and presenting discharge outlets for spraying the liquid downwardly

within the mixer casing in jets discharged at higher elevation than the top of the agitator; two metering devices respectively controlling the discharge of material and of liquid from the said two containers; conjointly operable means for actuating the agitator and the two metering devices, and means associated with the said conjointly operable means for adjusting the relative rate of operation of the agitator and the two metering devices.

13. The method of supplying adhesive-coated particles of solid material to a duct leading from a mixer to a spray device which comprises the continuous feeding of such material particles and of a liquid adhesive into the mixer under the influence of gaseous pressure sufficient for expelling the resulting mixture from the mixer through the said duct and through the spray device, and simultaneously therewith agitating the material particles and the adhesive within the mixer, at such relative rates of the said feeding that the said particles will only be surface-coated with the adhesive liquid while passing through the mixer.

14. The method of coating particles of solid material with a liquid adhesive and forcing the resulting adhesive-coated particles into a duct, which comprises the simultaneous downward feeding of such material and adhesive into a mixer sealed against the outer air and connected to the said duct while maintaining the upper portion of the interior of the mixer under gaseous pressure, and the agitating of the material and adhesive within the mixer, the said feeding and agitation being at such relatively proportioned rates that the particles of material are only surface-coated when forced from the mixer into the said duct by the said gaseous pressure.

15. The method of coating particles of solid material with a liquid adhesive which comprises as simultaneous steps the feeding of the said particles into a mixer sealed against the outer air and having a bottom outlet, the spraying of the adhesive downwardly within the upper portion of the mixer, the maintaining of a gaseous pressure within the said upper portion of the mixture, and the agitating of the said material within the mixer, the said feeding and spraying being so proportioned to the gaseous pressure that the particles of the material are only surface-coated with adhesive by the time they are forced out of the mixer into the said duct by the said gaseous pressure.

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