

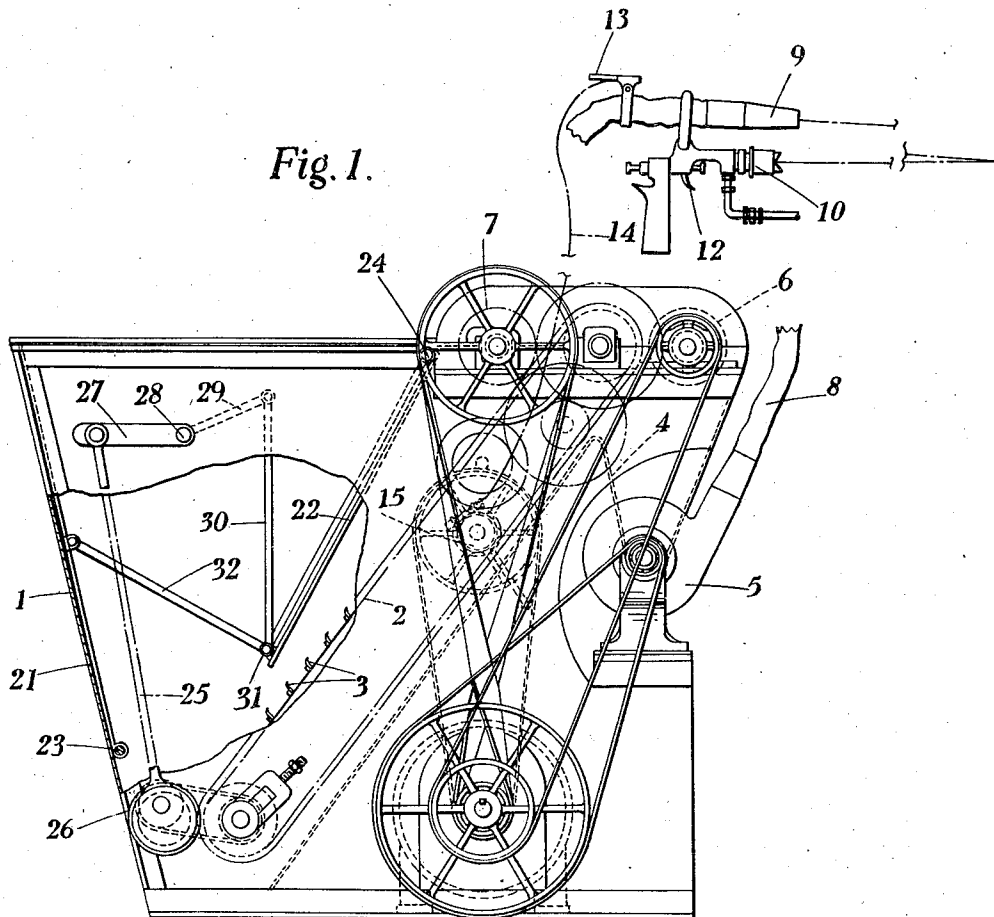
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1,990,585

COATING PROCESS

Original Filed Nov. 30, 1931 2 Sheets-Sheet 1



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Fig. 3.

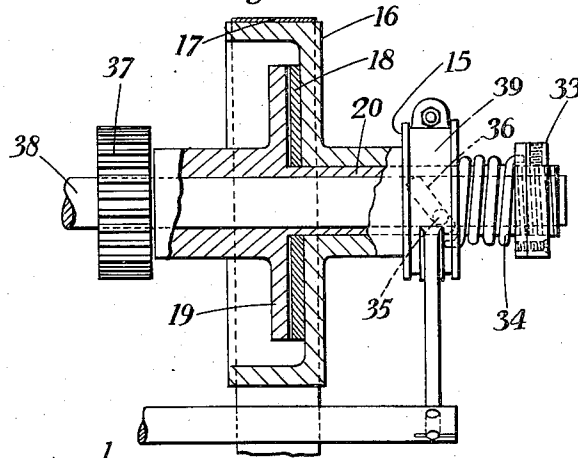
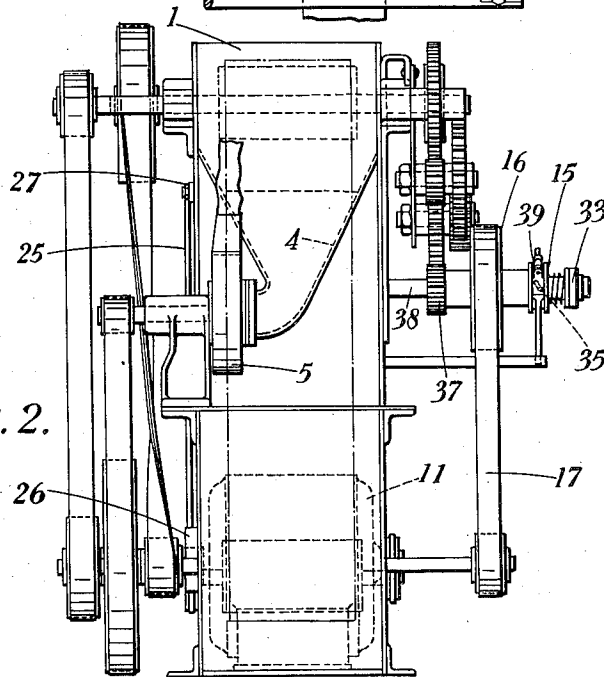


Fig. 2.



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1,990,585

COATING PROCESS

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Original application November 30, 1931, Serial No. 578,084. Divided and this application February 13, 1933, Serial No. 656,575. In Great Britain and India December 1, 1930

16 Claims. (Cl. 91—68)

This invention relates to the formation of coatings on to surfaces.

One object of the invention is to provide a method by which loose fibrous materials, among which may be noted, asbestos and slag wool, can be applied to the surfaces as ingredients in the coatings of such surfaces.

The handling of such materials and particularly mineral fibres, presents considerable difficulties owing to the tendency of the fibres to mat together and to form lumps which quickly block up any small orifice. It is thus a very difficult matter to move such materials by means of compressed air. On the other hand, in the formation of coatings on parts of structures which are relatively inaccessible, spraying is the simplest method to adopt. The invention aims at providing a process by means of which loose fibrous materials and particularly mineral fibres may be sprayed to form coatings and the necessary binding agents may also be applied similarly. It is to be understood that if a method is used which involves the application of an adhesive in a layer by means of a brush or trowel the advantages of spraying are largely lost, since the operator will have to reach all the parts to which the coating is to be applied when applying the adhesive.

In the preferred method in accordance with the present invention a suspension of mineral fibres in air is first formed and then while in the form of a true suspension is subjected to the action of a fan which draws in the suspension at its suction side, serves to disperse the suspension further rather than to agglomerate the fibrous particles together, and directs the suspension on to the surface to be coated. Simultaneously particles of a solid reagent are projected on to the surface to be coated as is also a liquid reagent of such a nature as to react with the solid reagent to form a material which binds the fibrous particles together and to the surface. Thus this process involves two features. First the dispersion of mineral fibrous particles in air and the movement of the resultant suspension by subjecting it to suction action, and secondly the simultaneous spraying of ingredients which are not themselves adhesives but which exert a cementing or binding action on the fibre on arriving at the surface to be coated.

If the surface is completely smooth it may be desirable first to roughen it in some way or another; for example netted wire may be spot-welded or soldered to metal surfaces or an adhesive such as emulsion of asphalt in water may be

applied as, for example, by spraying; such roughening or adhesive, however, does not constitute the essential binding medium by which the fibres are finally held to the surface but merely an initial binding medium which serves to hold the plastic mass formed by the fibres and reagents while that mass is drying.

A large variety of reagents may be employed. Thus, for example, particles of Portland cement may be mixed with the fibrous materials and sprayed simultaneously with them and at the same time water may be sprayed from a spray gun. Similarly calcined magnesite may be sprayed at the same time as a solution of magnesium chloride in water. Again, powdered resin may be mixed with the fibre and sprayed simultaneously with an emulsion of a solvent in water such, for example, as a mixture of turpentine and water made in the presence of an emulsifier.

The proportions of the various ingredients of the coatings may vary widely. In manufacturing coatings resembling asbestos cement it is preferred to form a coating containing four parts of cement to one of fibre, and it is found that the most satisfactory way of forming such a coating is to spray a suspension containing equal parts of asbestos and Portland cement and simultaneously to spray a Portland cement wash through the gun. However all the cement and fibre may be sprayed in suspension form and the percentage of fibre may be as low as 10 or as high as 60 in accordance with the quality of the fibre. Again, a mixture of fibre in 50% of magnesite is advantageous and in this case magnesium chloride solution of about 1.12 specific gravity may be sprayed simultaneously.

Instead of mixing the fibre and powder reagent in advance they may be sprayed separately. The invention is not limited to the use of powder reagents, although such a use represents the most advantageous form of the invention. Thus a single liquid or two liquid reagents may be used. In the latter case two separate streams of liquid reagents are sprayed simultaneously with a stream of fibrous particles and react to form a cementing substance binding the fibres to the surface.

It is found that one novel effect which can be obtained by means of the invention is the production of interior decorations having valuable acoustic properties and desirable appearance. This effect is attained by incorporating a colouring material, such as a pigment or dyestuff, in the liquid stream, at least in that part of the

stream which is sprayed to form the outer layer of the coating. By using white asbestos, a coating having any desired colour can be obtained without any crust such as would be produced if the coatings were painted after formation.

One apparatus which may be used in carrying out the processes of the invention is illustrated by way of example with reference to the accompanying drawings in which

Figure 1 shows a side elevation of the apparatus partly in section;

Figure 2 shows an end elevation looking from the left hand of Figure 1, and

Figure 3 shows a detail view of part of the apparatus.

The apparatus consists of a hopper 1 containing an endless travelling band 2 as of leather and provided with a large number of hooked prongs 3 which protrude through the band 2 and serve to pick up and hold loose fibre supplied to the hopper 1. The band 2 carries the asbestos to a point above a funnel 4 formed integral with the hopper 1 and in communication at its base with the suction side of a fan 5. A brush 6 arranged to rotate at a very high speed serves to detach the fibre from the band and simultaneously to open it out so that it falls in fibrous particles down the funnel 4. The fan 5 also draws in any dust formed while the fibres are being opened. A second brush 7 arranged to rotate at a moderate speed is placed close to the top of the band 2 so that in rotating it comes into contact with the fibre on the band and serves to control the quantity supplied to the brush 6.

The fan 5 should be one having relatively few blades spaced apart from one another, since it is found that a fan with a number of close-set blades does not convey the fibre satisfactorily.

A powdered solid reagent such as Portland cement is supplied separately to the suction side of the fan 5 in any suitable way such, for example, as by means of a second hopper similar to the hopper 1, and also connected to the suction side of the fan 5. Thus the fan draws in the particles of the fibre and cement suspended in air, and delivers them through a hose 8 having a nozzle 9. Water is simultaneously sprayed by means of a spray gun 10 connected to the end of a hose 8 so that on arriving at the surface to be coated the water reacts with the cement and serves to bind the fibrous particles into a solid coating.

All the moving parts are driven by a small electric motor 11 which is connected to drive the fan 5 and the brushes 6 and 7 through belts, as shown, while the endless band 2 is driven through a belt 17 which drives a pulley 16. The pulley 16 is connected by clutch mechanism to drive a hollow shaft 20 which is journaled on a fixed shaft 38 and to which a gear wheel 37 is keyed. This wheel 37 is connected through further gear wheels, as shown, to drive the endless band 2. The pulley 16 has a clutch lining 18 which can be pressed against a flange 19 on the hollow shaft 20. The latter passes through a flange sleeve 15 against which the end of the bearing surface of the pulley abuts. A collar 33 is fixed on the end of the shaft 20 and a helical spring 34 fixed at one end to the collar 33 and at the other end to the sleeve 15 surrounds the shaft 20 between the collar and the sleeve. A strap 39 surrounds the sleeve 15 and is connected by a Bowden wire 14 to an operating handle 13 mounted close to the end of the hose 8, as shown, or on the gun. The sleeve 15 normally rotates with the hollow shaft 20 and the pulley 16, so that when

the Bowden wire 14 is pulled tight the strap acts as a brake on the sleeve 15. The result is that a pin 35 which projects from the shaft 20 into engagement with a slot 36 in the sleeve 15 causes the shaft 20 to move axially relatively to the pulley 16 against the action of the spring 34 so that the clutch is taken out. The endless band will then stop. As long as the strap 39 continues to grip the sleeve 15 the clutch will remain out, because the sleeve 15 is held against rotation and the spring 34, which has been wound up as well as compressed, is not strong enough to cause the shaft 20, the gear 37, and the endless band 2, to rotate backwards. As soon, however, as the grip of the strap on the sleeve 15 is released the sleeve 15 can be rotated relatively to the hollow shaft 20 by the unwinding of the spring 34, and simultaneously the latter will expand and bring the flange 19 into engagement with the clutch lining 18 again.

The supply of a liquid reagent can be shut off at the same time as the supply of fibre by means of a valve trigger 12 which is provided as usual on the spray gun 10.

In practice it is desirable to prevent the fibre in the hopper from adhering to the sides thereof, and for this purpose two slowly moving agitators 21 and 22 are provided in the form of metal sheets. The sheet 21 is pivoted at 23 close to the end wall of the hopper 1 and the sheet 22 is pivoted at 24 so that it lies fairly close to and approximately parallel to the endless band 2. The two sheets 21 and 22 then form in effect the boundary walls of the hopper and are slowly rocked about their pivots through a small angle by a mechanism which consists of a rod 25 fixed to an eccentric 26 at one end and to a pivoted link 27 at the other end. The pivot 28 of the link 27 is rigidly connected to an arm 29. The latter is connected by a rod 30 to a pivot point 31 on the sheet 22, the point 31 being connected by a rod 32 to the sheet 21. The result is that an almost horizontal movement is imparted to the point 31 so that the sheets 21 and 22 are slowly rocked about the pivots 23 and 24 respectively. It will be seen that the fibre detached by the slowly running brush 7 is thrust downwards into the space between the band 2 and the sheet 22 and escapes into the bottom of the hopper.

The amount of fibre supplied to the fan can, of course, also be regulated by varying the speed of the endless band 2. This can easily be done by changing the gear ratio between the motor and the band.

If desired the bottom of the hopper may be enlarged or widened so as to provide ample space and thus to reduce choking or bridging of the fibre.

The whole apparatus may easily be made mobile by mounting it upon a frame or trolley. It thus can easily be taken to any point where it is required and has the great advantage that in general only one man is needed to operate it.

The present application is a divisional of my co-pending application, Serial No. 578,084, filed on November 30th, 1931.

I claim:—

1. In a process for depositing on to the surface of a body a coating which includes loose fibrous material, the steps which comprise forming a suspension of the fibres in air, then subjecting said suspension to the suction action of a fan, conveying said suspension on to the surface to be coated, simultaneously projecting particles of a solid reagent on to said surface and

also simultaneously spraying the surface with a liquid reagent which serves to react with the solid reagent to form material which binds the fibres together and to the surface.

2. In a process for depositing on to the surface of a body a coating which includes loose fibrous material, the steps which comprise forming a suspension of the fibres in air, then subjecting said suspension to the suction action of a fan, conveying said suspension on to the surface to be coated, simultaneously projecting finely divided Portland cement on to the surface and also simultaneously spraying the surface with water which serves to react with the Portland cement and thereby form a matrix which binds the fibres together and to the surface.

3. In a process for depositing on to the surface of a body a coating which includes loose fibrous material, the steps which comprise forming a suspension of the fibres in air, then subjecting said suspension to the suction action of a fan, conveying said suspension on to the surface to be coated, simultaneously projecting calcined magnesite on to the surface and also simultaneously spraying on to the surface a solution of magnesium chloride in water to cause a reaction with the calcined magnesite and thus to form an adhesive which binds the fibres together and to the surface.

4. In a process for depositing on to the surface of a body a coating which includes loose fibrous material, the steps which comprise forming a suspension of the fibres in air, then subjecting said suspension to the suction action of a fan, conveying said suspension on to the surface to be coated, simultaneously projecting powdered resin on to the surface and also simultaneously spraying the surface with a reagent that serves to react with the resin and form with it an adhesive which serves to bind the fibres together and to the surface.

5. In a process for depositing on to the surface of a body a coating which includes loose fibrous material, the steps which comprise forming a suspension of particles of a solid reagent and the fibres in air, then subjecting said suspension to the suction action of a fan, conveying said suspension on to the surface to be coated, and simultaneously spraying the surface with a liquid reagent, said liquid reagent being so directed as to mingle with said fibres and solid reagent and react with the latter so as to form an adhesive which serves to bind said fibres to the surface.

6. In a process for depositing on to the surface of a body a coating which includes loose fibrous material, the steps which comprise affixing netted wire to a body having a smooth surface for the purpose of roughening said surface, forming a suspension of the fibres in air, then subjecting said suspension to the suction action of a fan, conveying said suspension on to the surface to be coated, simultaneously projecting on to the surface a solid reagent and also simultaneously spraying a liquid reagent in such a manner as to react with the solid reagent and bind the fibres together and to the surface.

7. In a process for depositing on to the surface of a body a coating which includes loose fibrous material, the steps which comprise simultaneously dispersing the fibres and Portland cement in air to form a suspension then subjecting said suspension to the suction action of a fan, conveying said suspension on to the surface to be coated, and simultaneously spraying the surface with water,

said water being so directed as to mingle with said fibres and said Portland cement and form with the latter an adherent coating which binds the fibres to the surface.

8. In a process for depositing on to the surface of a body a coating which includes loose fibrous material, the steps which comprise forming a suspension of the fibres and calcined magnesite in air, then subjecting said suspension to the suction action of a fan, conveying said suspension on to the surface to be coated, and simultaneously spraying the surface with a solution of magnesium chloride in water to cause a reaction with the calcined magnesite and form an adherent coating which binds the fibres to the surface.

9. In a process for depositing on to the surface of a body a coating which includes loose fibrous material, the steps which comprise forming a suspension of a solid reagent and the fibres in air, then subjecting said suspension to the suction action of a fan, conveying said suspension on to the surface to be coated, and simultaneously projecting a liquid reagent so that it mingles with said suspension of fibres and solid reagent and travels therewith to the surface, the liquid reagent and the solid reagent together serving to form an hydraulic cement which adheres to the surface and binds the fibres to it.

10. In a process for depositing on to the surface of a body a coating which includes loose fibrous material, the steps which comprise forming a suspension of the fibres in air, then subjecting said suspension to the suction action of a fan, conveying said suspension on to the surface to be coated, and simultaneously spraying on to said surface two separate reagents capable of reacting together to form a material which binds the fibres together and to the surface.

11. In a process for depositing on to the surface of a body a coating which includes loose fibrous material, the steps which comprise forming a suspension in air of the fibres, subjecting said suspension to the suction action of a fan, conveying said suspension on to the surface to be coated, and simultaneously spraying said surface with a liquid adapted to unite with the particles of said suspension to form a mass adherent to said surface.

12. The combination of steps claimed in claim 11, and incorporating a colouring material in at least that part of the liquid that is sprayed during the formation of the outer layer of the adherent mass.

13. In a process for depositing on to the surface of a body a coating which includes mineral fibres having a tendency to mat, such as white asbestos the steps which comprise forming a suspension in air of such asbestos fibres, subjecting said suspension to the suction action of a fan, conveying said suspension on to the surface to be coated, and simultaneously spraying said surface with a liquid adapted to unite with the particles of said suspension to form a mass adherent to the surface, and incorporating a colouring material in at least that part of the liquid that is sprayed during the formation of the outer layer of the adherent mass.

14. In a process for depositing on to the surface of a body a coating which includes loose fibrous material, the steps which comprise mechanically dispersing the fibres whereby to form a suspension of the fibres in air, dispersing the fibres of said suspension further by subjecting the suspension to the suction action of a fan, conveying the suspension on to a surface to be coated, and simultaneously spraying said surface with a liquid

adapted to unite with the particles of said suspension to form a mass adherent to the surface.

15. In a process for spraying the surface of a body with loose fibrous material and a liquid capable of uniting with the fibres thereof to form a
5 coating adherent to the surface, the steps of opening out the fibres to be sprayed whereby to form them into a suspension in air, and then subjecting said suspension to the suction action of a fan.

10 16. In a process for depositing on to the surface of a body a coating which includes loose fibrous material, the steps which comprise delivering

such material to a dispensing mechanism, controlling the quantity of the material so delivered, dispersing said material whereby to form a suspension of the fibres in air, subjecting said suspension to the suction action of a fan, conveying
5 such suspension on to the surface to be coated, and simultaneously spraying said surface with a liquid adapted to unite with the particles of said suspension to form a mass adherent to the surface.

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