May 25, 1948. J. L. KEMPTHORNE 2,442,206

SPRAYING DEVICE FOR FIBROUS MATERIAL

Filed June 30, 1945 2 Sheets-Sheet 1

Fig. 1

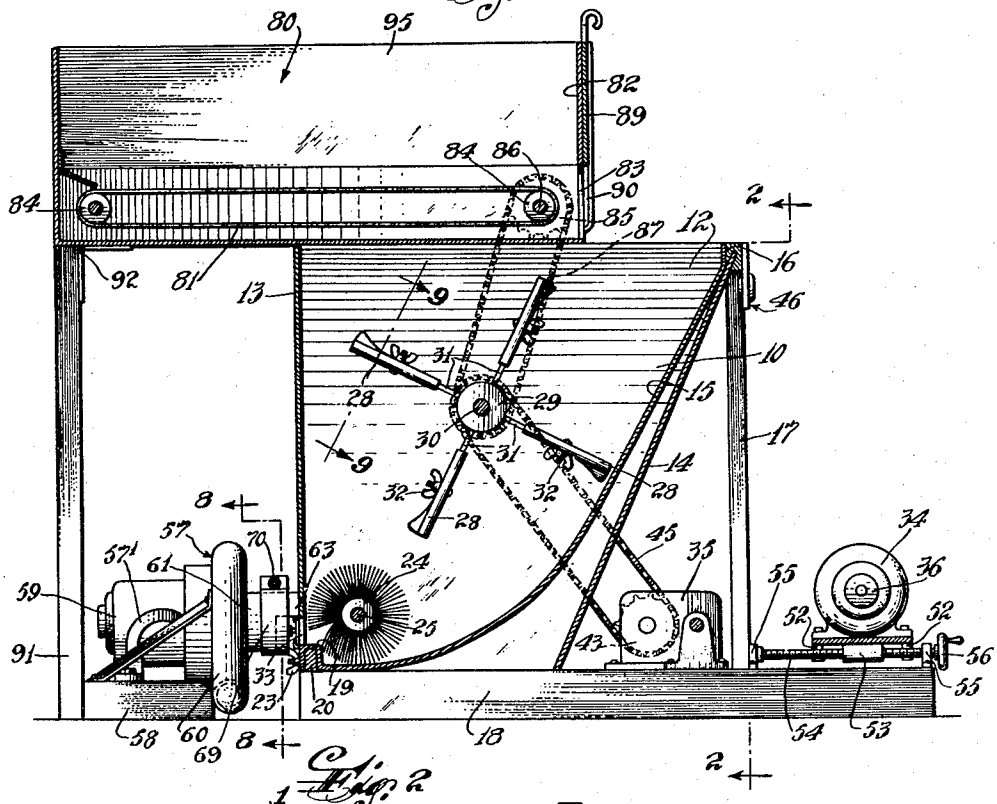


Fig. 2

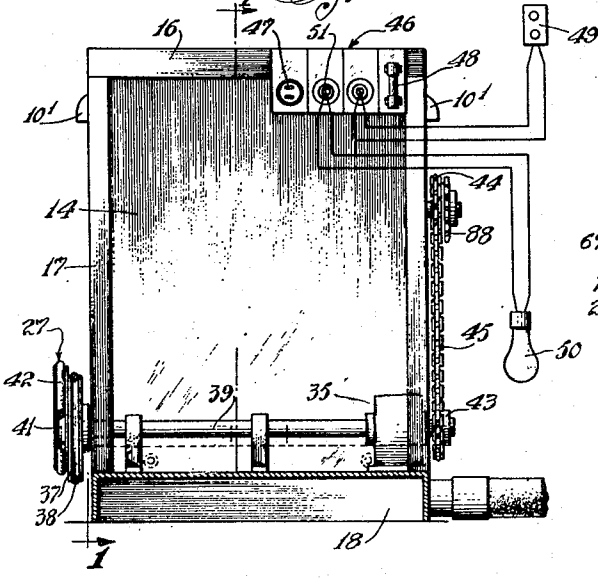
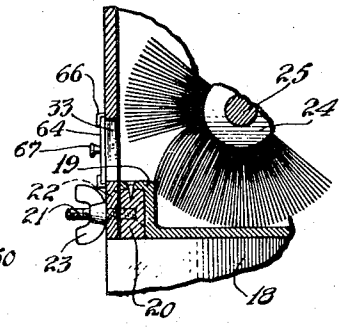


Fig. 3



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Fig. 4

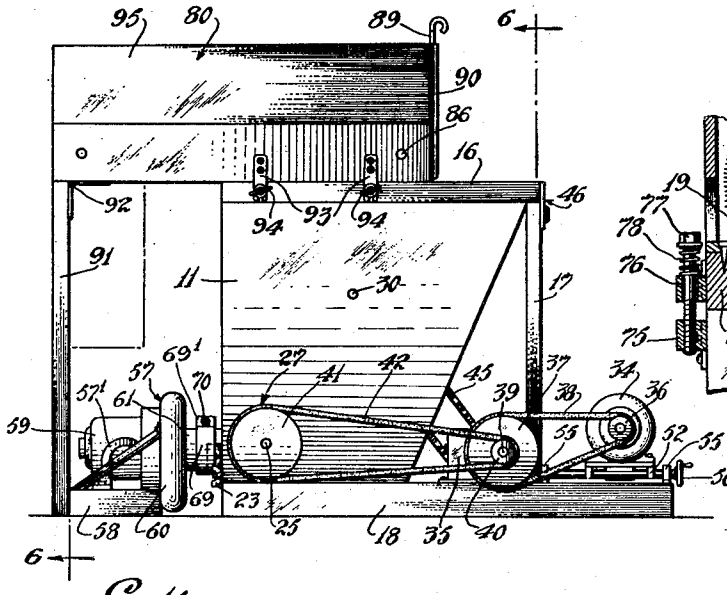


Fig. 5

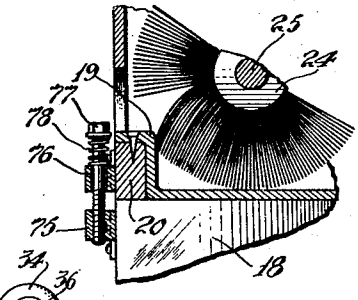


Fig. 8

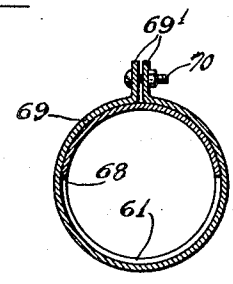


Fig. 6

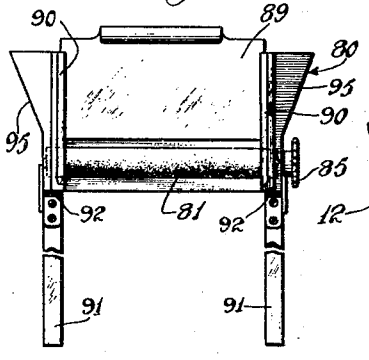
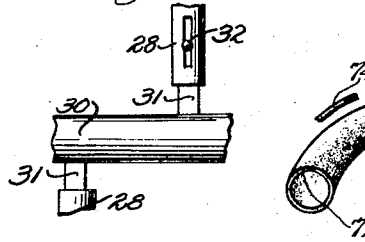
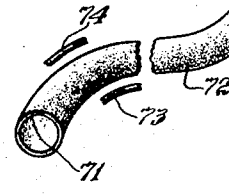


Fig. 7

Fig. 9.





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2,442,206

SPRAYING DEVICE FOR FIBROUS MATERIAL

James L. Kempthorne, Montclair, N. J.

Application June 30, 1945, Serial No. 602,547

1 Claim. (Cl. 91—8)

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This invention relates to spraying devices such as are used, for example, in the spraying of asbestos and other fibrous and similar materials onto ceilings and other surfaces or objects.

It is common in the art to provide a device having means for receiving the fibrous material and for projecting said material onto the surface to be coated. It is also common in the art to provide a discharge nozzle for the apparatus through which the material passes and to provide means for mixing the materials with a second material such as water, adhesive, or the like. The inherent disadvantages in the structures of the prior art and in the structures commercially used for the purpose set forth above are many and varied. Among the more serious objections is the fact that such structures are usually of considerable weight and are so bulky that they cannot be used in many situations, such as for work in the interior of ships or other confined quarters. In some cases it has been necessary to actually tear down parts of ships or buildings to permit spraying apparatus to be moved thereinto.

A further serious disadvantage of the structures commercially used and shown in the prior art is that such structures are of considerable weight so that the transportation and positioning thereof is a difficult and awkward task, requiring the use of lifting devices and precluding the use of the spraying apparatus except at locations having substantial foundations or supporting structures.

The foregoing and other disadvantages of the structures of the prior art and of the commercial structures popularly used are obviated by the device of my invention, which consists of a spraying device having complementary units which are manually portable, are extremely light in weight and may be set up for operation and moved from place to place in a minimum of time.

A further object of the invention is to provide a novel means for fluffing the fibrous material deposited in the chamber unit so as to open or fluff the same, and for picking up said material by means of a brush which is so juxtaposed relative to a shouldered edge plate that the material fed to the brush is picked up thereby and, in a flipping motion of the brush, projected into the intake port of an exhaust blower.

A further object of the invention is to provide a manually portable exhaust blower and discharge unit which is extremely light in weight and may be readily placed in operative position

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against the discharge aperture of the chamber unit.

A further object of the invention is to provide a supplementary hopper unit which is likewise manually portable and is adapted to be positioned in operative relation with the chamber unit and may be conveniently displaced therefrom.

These and other advantageous objects, which will later appear, are accomplished by the simple and practical construction and combination of parts hereinafter described and more particularly shown in the drawings, illustrating embodiments of my invention, and in which:

Fig. 1 is a longitudinal vertical sectional view of a spraying apparatus embodying my invention, taken along approximately the line 1—1 of Fig. 2,

Fig. 2 is an end elevational view, partly in section, taken on the line 2—2 of Fig. 1,

Fig. 3 is an enlarged fragmentary, vertical, sectional view of parts of the chamber unit correspondingly numbered in Fig. 1,

Fig. 4 is a side elevational view of the structure shown in Fig. 1,

Fig. 5 is a fragmentary, vertical sectional view corresponding to that shown in Fig. 3 but showing a modified form of the invention,

Fig. 6 is an elevational view of the supplementary hopper unit alone, taken on line 6—6 of Fig. 4,

Fig. 7 is a fragmentary perspective view of the blower unit and chamber unit of my invention,

Fig. 8 is an enlarged vertical sectional view taken on line 8—8 of Fig. 1,

Fig. 9 is a fragmentary elevational view taken on line 9—9 of Fig. 1, showing the disposition of the fluffing spokes or blades 31 along the fan axle.

As shown in the drawings, the apparatus of my invention comprises a manually portable chamber unit 10 open at the top (see Fig. 1) for the depositing of the fibrous or other material thereinto. Said chamber unit is provided with spaced parallel side walls 11 and 12 connected by a front wall 13 and rear wall 14, all of said walls being fixed at their lower edges to a base member 18. The chute plate 15 is fixed intermediate the walls 11—14, in a generally angular direction from the cross member 16 of the frame 17 at one end and fixed to front wall 13 adjacent said base 18 at a position adjacent the discharge aperture 33 in the front wall 13 of the chamber unit at the other end. The lower end of the chute plate 15 is provided with a shouldered edge plate 19 fixed to a bar 20, the latter being adjustably secured to the front wall 13 by means which will permit of the limited vertical positioning of said bar (and the

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attached shouldered edge plate 19) relative to base 18. Any suitable interengaging elements may be used for that purpose; for example, bolts 21 may be fixed to the bar 20 to project through vertical slots 22 in the front wall 13 of the chamber 10, with nut members 23 threadedly engaging said bolts and the front wall 13.

A brush member 24 is rotatably journalled in the chamber unit 10 adjacent the lower end of chute 15, said brush being so juxtaposed relative to the shouldered edge plate 19 (see Figs. 1, 3 and 5) that the shouldered edge plate 19 will project into the circumference of the brush to a slight degree. Thus, on the rotation of the brush responsive to any suitable rotating means 27, the brush will "lip over" the shouldered edge plate 19, causing the brush bristles to momentarily slide upon said plate and then, in a snapping movement, to flex over and past the top of the shouldered edge plate 19. By this action, the material which has been fed to the brush in chamber 10 and has been taken up by the brush bristles, will be projected from the brush beyond the shouldered edge plate 19.

Shouldered edge plate 19 may be formed integral with the chute plate 15, as shown in the drawings, or may be formed as a separate member if so desired. It may, as shown in Fig. 5, be urged on to the base 18 under spring tension, while providing for limited vertical movement to prevent damage to the parts due to unusual conditions encountered in operation. The spring tension means shown consists in affixing an internally threaded boss 75 to the base 18 and affixing an apertured member 76 to the bar 20 to which the shouldered edge plate 19 is fixed. Bar 20 in the form shown in Fig. 5 is aligned with the outer surface of the front wall 13 and projects through an opening therein instead of slidably abutting the inner surface thereof as in the form shown in Fig. 3. A bolt 77 freely passes through member 76 and threadedly engages the boss 75. A spring 78 is positioned on bolt 77 intermediate the head of the bolt and the member 76.

The chamber unit 10 may be provided with handles 10' (see Fig. 2) of any desired configuration, to facilitate the manual transportation and movement of said chamber unit. A fluffing fan 29 is rotatably journalled in the chamber unit 10 above the brush 24 and adjacent the chute 15 and approximately intermediate the length of the latter. The axle 30 of said fluffing fan 29 is rotatably journalled in the side walls of the chamber unit. Blades 28 are mounted on spokes 31 of the fan 29, said blades being preferably relatively long and wide and of hollow cross section to enable them to be adjustably positioned on the spokes 31 of said fan, by bolt and nut members 32 or other suitable means for clamping them on the spokes and to permit of the fixing of the position of said blades on axes perpendicular to the longitudinal axes of said spokes. The latter are preferably of circular cross section and of relatively small diameter.

In the use of the device for feeding fibrous materials such as asbestos to the brush 24, it is preferable to utilize a pair or more of sets of spokes and attached blades fixed to the hub 29 of the fan, with the sets of spokes aligned or disaligned as desired. The hub of the fan may further be provided with flat plates fixed thereto and projecting therefrom between the sets of the spokes for the purpose set forth, namely, to "fluff" the material positioned in the chamber unit through the open top thereof.

The front wall 13 of the chamber is provided with a discharge aperture 33 aligned with the shouldered edge plate 19 and continued thereabove for a distance sufficient to provide a clear trajectory for the material which is projected from the brush 24 when the latter contacts the shouldered edge plate 19 as above set forth.

The chamber 10 may have any suitable motor means 34 for driving the brush 24 and the fan 29, said motor being fixed to the base 18, so that the chamber 10 and associated parts on the base 18 will be a self-sufficient, portable unit. To this end, the chamber 10 and its base 18 may be provided with the usual power transfer means, namely, pulleys, belts, chains and gear devices entrained with the motor 34, the brush 24 and fan 29. In the form shown in the drawings, said power transfer means comprises a pulley 36 on the motor shaft, a pulley 37, a belt 38 entrained over said pulleys, the pulley 37 being fixed to shaft 39 of the speed change device 35. Shaft 39 has a second pulley 40 fixed thereto, driving the pulley 41 which rotates the brush shaft 25 through the medium of belt 42. A sprocket 43 driven from the motor 34 through the speed change device 35 drives the sprocket 44 (keyed to axle 30 of the fan 29) by means of chain 45.

The device may be provided with an electrical unit 46 suitably connected to motor 34 to provide for electrical connection of the motor to a source of current, with switch, fuse, and light means to facilitate operation of the device. In the form shown in Fig. 2, said unit 46 comprises an electric plug 47 for convenient connection with a source of electric current, a fuse 48, switch 49 and electric bulb 50 connected to the unit 46 at 51. The apparatus described above is portable, compact and self-sufficient. Its weight and size are but a fraction of the weight and size of standard devices in commercial use for doing the same work. It may be readily transported to the place where the work is to be done and is admirably adapted for repair work and small jobs where use of the conventional mechanisms would be impractical and much more costly.

Operation of chamber unit 10

In operation, the motor 34 is energized by means of the switch 49 and the asbestos or other material to be used is deposited into the chamber 10 through the open upper end thereof. The material is fluffed down the chute plate 15 and to the brush 24 by the blades 28 of the fan 29. The rotating brush contacts the shouldered edge plate 19 and projects the material through the aperture 33 in the front wall 13 of chamber unit 10. From the foregoing it will be seen that I have provided a novel means for metering the material through the unit 10 and for opening the fibers of said material, which is of distinct advantage in the application of asbestos and similar fibrous materials. I preferably provide a rapid means for regulating the speed of rotation of brush 24 and fan 29. This end may be attained by any conventional device for regulating the speed of rotation of the motor shaft or by a means as shown in Figs. 1 and 4 for altering the effective diameter of the motor pulley 36 in contact with entrained belt 38. The motor pulley 36 is preferably of a commercial form well known in the electrical art, wherein the pulley is vertically divided into halves which are normally held together responsive to spring pressure and which may be moved apart responsive to opposing force or pressure exerted thereon by belt 38. The motor has lugs 52 depending there-

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from which slidably receive rails on which the motor may be slid, and has an internally threaded plate 53 depending therefrom for threadedly receiving the threaded shaft 54 journalled in bearings 55 on base 18. By rotating the handwheel 56 keyed to the shaft 54, the motor 34 may be reciprocated relative to the shaft 39 of pulley 37, thus varying the tension of belt 38 on pulley 36 and correspondingly varying the spacing of the halves of said pulley, and, thereby, their effective diameter for the purpose described.

The chamber unit 10 and associated parts above referred to are well adapted for use in spraying fibrous materials onto ceilings and other surfaces.

Blower unit 57

The material projected through opening 33 is taken up by blower unit 57 and discharged therefrom through discharge pipe 72 or the like onto the surface or other object to be coated. The blower unit 57 in the form shown in the drawings is also manually portable and self-sufficient. It has a base 58 on which is mounted the motor 59 and the casing 60 containing a suction fan driven by the motor 59. The casing 60 is provided with inlet and outlet ports 61 and 62 respectively. In operation, blower unit 57 is positioned against the unit 10 as shown in Fig. 7 with the free end 63 of the blower inlet port 61 abutting the opening 33 of unit 10. The size of opening 33 may be varied by any suitable means to suit conditions of use. For example, the front wall 13 may have doors 64, 65 slidably arranged in channeled members 66 and horizontally aligned with the opening 33 which is disposed intermediate said doors. The width of said aperture 33 or the effective size thereof may thus be reduced or regulated by sliding said doors toward or away from each other. The doors are preferably provided with handles 67 to facilitate movement thereof. The end 63 of the inlet port 61 of the blower is recessed as at 68, to provide an ample supply of air with the materials drawn into the inlet port from the aperture 33 and into the casing 60, and thence discharged through the pipe 72.

The recess 68 may be closed to the desired degree by any suitable means, as by collar 69 slidably disposed on the port 61 and slidable over the recessed portion 68 thereof. The collar is preferably provided with free ends 69' having bolt or other means 70 to clamp the collar on the port 61. The blower unit 57 is also manually portable and may have handles 57'.

The free end 71 of the discharge pipe 72 may be in the form of a nozzle with connections 73, 74 of any desired or convenient type for mixing the material passing from the outlet port 62 with adhesives, water or other material. Such material may be mixed within the chamber 10 if so desired. The particular form of nozzle and associated parts 73, 74 used in connection with my invention is not an essential part of the invention. Any of the many forms available commercially and known in the art may be used in connection therewith.

Hopper unit 80

The chamber unit 10 may be provided with means for automatically feeding material thereto. In the drawings I have shown a hopper unit 80 for that purpose, comprising a member open at the top and having an endless belt 81 at the bottom thereof to carry the material deposited into said hopper to the forward end 82 thereof for discharge through the aperture 83 (said aperture being in alignment with belt 81) and into the chamber 10. The endless belt 81 may be of any desired material and construction and is entrained over the rollers 84, one of which is rotated by the sprocket 85 keyed to the shaft 86 of the roller, said sprocket having chain 87 in mesh therewith, and with the sprocket 88 of the fan shaft 29, which in turn is driven by chain 45 as above described. The hopper discharge aperture 83 may be partly or wholly closed by the door 89 which may have frictional sliding engagement with channels 90 fixed to the hopper 80. The hopper 80 is likewise manually portable, is provided with leg members 91 hinged thereto as at 92 adapted to be folded under the hopper proper when the latter is not in use, and is further provided with lugs 93 depending from said hopper, said lugs being adapted to be engaged by complementary latching means, such as bolts 94 carried by the hopper 10, to removably secure the hopper to the chamber unit 10. It will thus be seen that the hopper 80 is removably secured to the chamber unit 10, with the discharge opening 83 of the hopper disposed in alignment with the open upper end of the chamber 10.

In operation, the hopper 80 is filled with the material to be sprayed which is metered by the belt 81 into the chamber 10 where the fan 29 fluffs the material. The latter passes down the chute 15, is picked up by the brush 24 which rotates against the shouldered edge plate 19, whereby the material is ejected into the blower 57 and thence onto the surface or other object to be coated. The side walls 95 of the hopper unit are preferably inwardly and downwardly tapered (see Fig. 6) so as to guide the material onto the belt 81. To remove the hopper from the chamber unit 10, the bolts 94 are loosened and the sprocket 85 may be laterally displaced from the shaft 86 of the roller. This end may be attained by providing the sprocket and shaft with complementary interlocking means, such as key and keyway to normally key them together while permitting of their manual disengagement when desired, and means, such as a cotter pin, bolt or the like, to preclude accidental displacement thereof. Or if desired, the chain 87 may be removed from the sprocket 85 for the same purpose.

The various shafts shown may be provided with suitable anti-friction bearings such as ball or roller bearings or the like.

The parts described may be made of any suitable material. It is to be understood that the dimensions of the parts, except where otherwise noted, may be varied and their relative proportions changed to suit the requirements of the user, within the scope of this invention. The drawings illustrate certain embodiments of the invention for the sake of illustration only; it will be understood that all variations thereof within the terms of the appended claim shall be deemed to come within the scope and purview of this invention.

The blower unit 57 may be provided with suitable switch means for motor 59 synchronized with or independent of the switch unit 49 for the motor 34 of chamber unit 10. The discharge pipe 72 and associated connections 73 and 74 may be provided with nozzle and control means of any desired or convenient form.

The front wall 13 of chamber 10 may be provided with a door 96 vertically slidable in channels 97, said door being adapted to close an aperture in the front wall 13 adjacent the brush 24

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for repair or replacement of the brush, as shown in Fig. 7.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

In a spraying device, a chamber unit provided with substantially vertically disposed side walls adapted to receive material to be sprayed and provided with a material intake and a bottom discharge opening in a side wall of the unit for enabling discharge of material to be sprayed, a curved chute plate mounted in the unit with its upper end engaging a side wall of the unit opposite to the side wall in which the bottom discharge opening is located and curving from the bottom of the unit to the discharge opening for receiving material being introduced into the chamber unit, fluffing means adjacent to the curved chute plate for operating on the material being sprayed for fluffing the said material, a rotatable brush having radially disposed bristles mounted on an axis parallel to the discharge opening and in front of the said discharge opening and above the bottom portion of the curved chute plate at a sufficient distance so that the bristles of the brush make a wiping contact with the plate, the bottom edge of the plate adjacent to the discharge opening being upturned in advance of the opening to form a lip in engagement with the brush, whereby upon rotation of the brush the bristles thereof pick up material from the plate and contact the lip for projecting the material through the discharge opening.

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