Feb. 12, 1952 J. L. KEMPTHORNE 2,585,133

APPARATUS FOR SPRAYING PARTICLES OF INSULATING MATERIAL

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Fig. 4

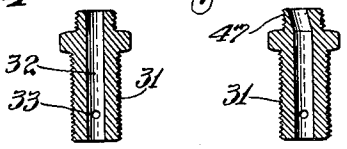


Fig. 4a

Fig. 3

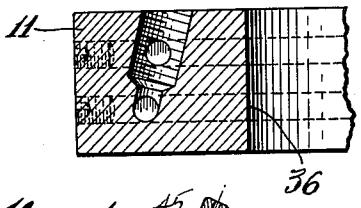


Fig. 1

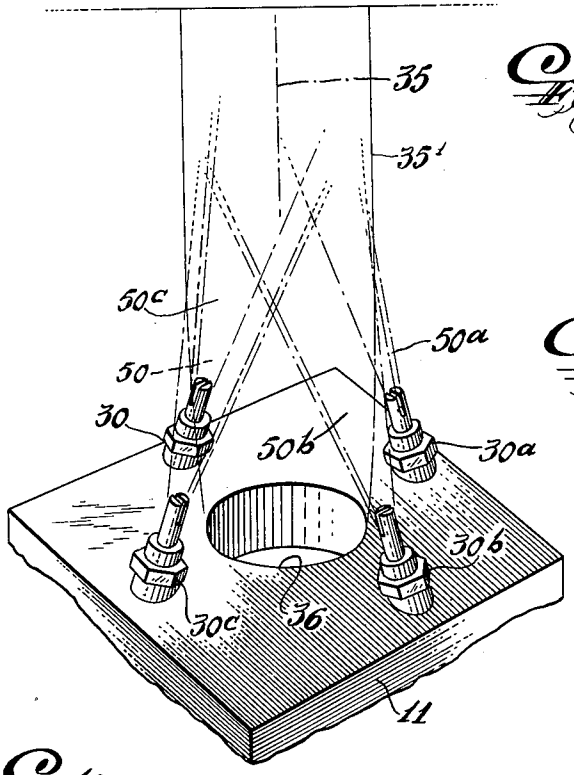


Fig. 4b

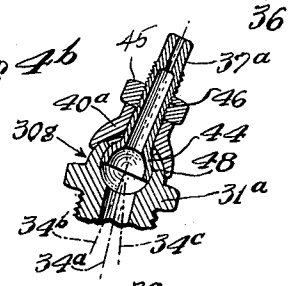


Fig. 5

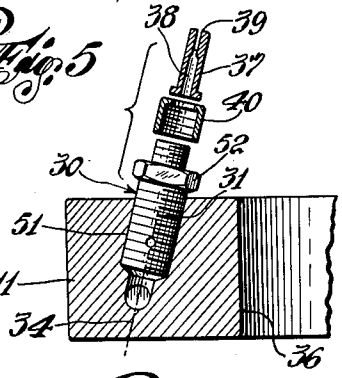


Fig. 6

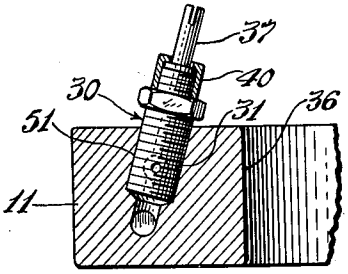
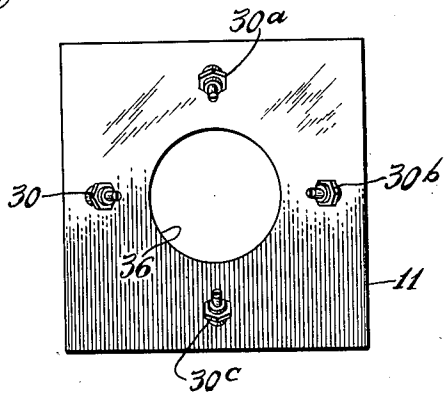


Fig. 2



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Fig. 7

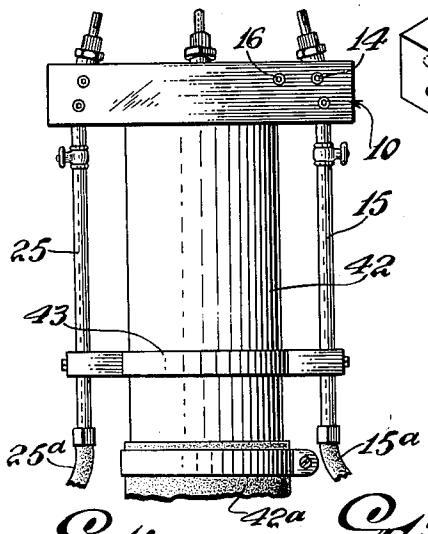


Fig. 8

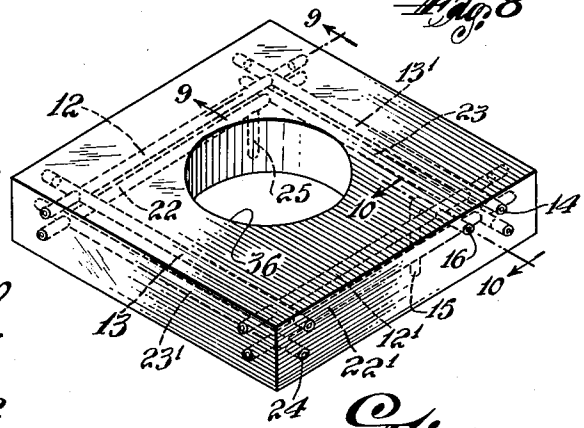


Fig. 12

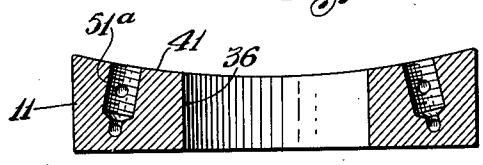


Fig. 9

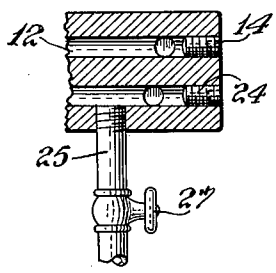


Fig. 10

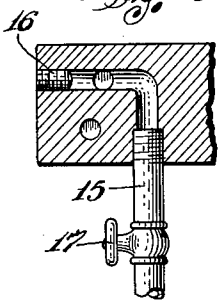


Fig. 13

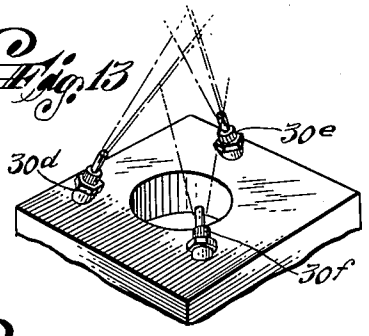


Fig. 14

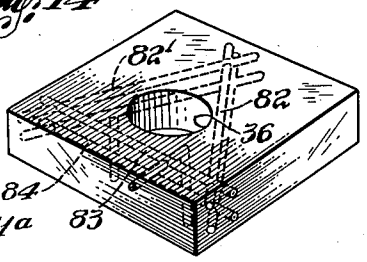
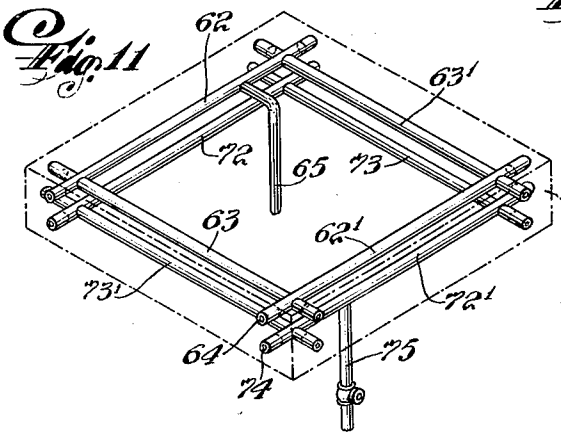


Fig. 11



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UNITED STATES PATENT OFFICE

2,585,133

APPARATUS FOR SPRAYING PARTICLES OF INSULATING MATERIAL

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Application February 1, 1950, Serial No. 141,682

3 Claims. (Cl. 299—86)

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This invention relates to the art of spraying insulation material, such as asbestos and other thermal and sound insulation materials, onto surfaces to be coated therewith. Such materials are applied by projecting the same from a gun head directed toward the surface to be coated, the gun being moved to project the material to the point of application. The material to be applied is usually of a light, fibrous nature projected in the form of a stream under pressure. The particles tend to depart from the main path of the stream, creating considerable turbulence and resulting in an untidy method of application.

The apparatus of the instant invention, as will appear more particularly hereinafter, is designed to avoid the objections above noted and to provide for the "boxing-in" of the projected stream of insulation material.

These and other advantageous objects, which will appear from the drawings, and from the description hereinafter, are accomplished by the structure of my invention, of which an embodiment is illustrated in the drawings. It will be apparent, from a consideration of said drawings, and the following description, that the invention may be embodied in other forms suggested thereby, and such other forms as come within the scope of the appended claims are to be considered within the scope and purview of the instant invention.

In the drawings:

Fig. 1 is a fragmentary, perspective view of a spray gun embodying one form of the invention, also showing, schematically, the method of the invention,

Fig. 2 is a top plan view of the spray gun head, shown in Fig. 1,

Fig. 3 is a fragmentary, vertical, sectional view thereof,

Fig. 4 is a vertical sectional view of a nozzle base used in carrying out the invention,

Fig. 4*a* is a similar view of another form of base member,

Fig. 4*b* is a similar view of another form of base member and associated nozzle parts shown secured to a spray gun head,

Fig. 5 is a view similar to Fig. 3, but showing the nozzle base of Fig. 4 secured to the spray gun head, the other nozzle parts being shown in exploded position,

Fig. 6 is a similar view, showing said nozzle assembled and applied to the gun head,

Fig. 7 is a side elevational view of the spray gun embodying the invention,

Fig. 8 is a phantom perspective view of the spray gun head,

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Fig. 9 is an enlarged fragmentary, sectional, elevational view, taken on line 9—9 of Fig. 8,

Fig. 10 is a similar view, taken on line 10—10 of Fig. 8,

Fig. 11 is a phantom perspective view of a spray gun head in another form of the invention,

Fig. 12 is a vertical sectional view of a spray gun head embodying another form of the invention,

Fig. 13 is a perspective view of another form of apparatus embodying the invention, and

Fig. 14 is a phantom perspective view thereof.

The drawings show an apparatus 10 embodying the invention, comprising a head 11 provided (see Fig. 8) with a continuous compressed air circuit comprising a pair of air tubes 12, 12' disposed in spaced, parallel relation, and a second pair of air tubes 13, 13' disposed in the head in connected and criss-cross relation to the first mentioned pair, air tube clean-out plugs 14 being disposed in and closing the free ends of the tubes, as shown in Fig. 9. By the arrangement described, it will be apparent that the cleaning out of the tubes 12, 12', 13, 13' requires only the removal of the plugs which makes accessible the entire length of the tubes. This feature is extremely valuable from a practical standpoint. An air line 15 is connected to the circuit, as shown in Fig. 10, and may be provided with a clean out plug 16 and valve 17. The spray gun head is further provided with a continuous adhesive circuit, comprising a pair of parallel adhesive tubes 22, 22' and a second pair of adhesive tubes 23, 23' disposed in the head in connected and criss-cross relation to the first mentioned pair, clean out plugs 24 being disposed in and closing the free ends of the tubes. An adhesive line 25 is connected to the adhesive circuit, as shown in Figs. 8 and 9, and may be provided with a valve 27.

The specific relative disposition of air and adhesive circuits is a matter of choice; their relative disposition may be reversed if found convenient. Pressure in the respective circuits is highest at the point of entry of line 15 or 25 and decreases progressively therefrom. This difference will, in many cases, not be important enough to warrant specific compensation therefor but, where found advisable, any suitable expedient, such as the enlargement of apertures 32, 33, 38 and 39 of the nozzles and/or tubes dependent on their relation to the point of entry of line 15 or 25, may be adopted.

Three or more nozzles 30, 30*a*, 30*b* and 30*c* are connected to the adhesive and air circuits. The description of one of the nozzles (30) will

suffice for all, which may be of identical structural features. Said nozzle comprises (Figs. 4, 5 and 6) a base **31** having a longitudinal aperture **32** therethrough for open communication with the lower (adhesive) circuit. An aperture **33** is provided in said base **31** in communication with the longitudinal aperture **32**, said aperture **33** being so disposed that when the base **31** is threaded into threaded recess **51** of the gun head, as shown in Figs. 5 and 6, it will register with the (upper) air circuit. The nozzle **30** is disposed in the gun head **11** in an axial line **34** at an acute angle to the axial line **35** of the stream of insulated particles projected through opening **36** in the gun head (Figs. 1 and 5) or through any other open member secured to the gun head. The nozzle head **37** is provided with a lower axial recess **38** and with an elongated slotted discharge recess **39** at the upper end thereof communicating with recess **38**. A cap **40** is adapted to connect the nozzle head **37** to the base **31**, as shown in Figs. 5 and 6. The base **31** may be provided with a nut-like portion **52** to facilitate gripping the same to rotate the said base into and out of engagement with the gun head **11**.

By the arrangement described, it will be apparent that the nozzles may be readily and accurately positioned in the gun head, and that the nozzle heads may be secured to the base portions of the nozzles at precisely the required position for proper alignment of the upper, slot ends **39** of the nozzles. As schematically shown, for example, in Fig. 1, the nozzles are disposed to project flat walls of adhesive **50**, **50*a***, **50*b***, and **50*c*** under pressure, which converge on the stream **35'**. The walls **50—50*c*** are directed to a single focal point, closing on the stream to provide overlapping box-like walls which confine the particles of the stream and prevent random movement thereof. The arrangement described provides for concentrated flat walls of adhesive under pressure directed in overlapping arrangement to close on the stream to box the same in, thoroughly wetting the stream and defining finite marginal lines thereto, avoiding the air turbulence incident to flowing of particles from the stream path proper by use of the conventional spray apparatus.

As shown in Fig. 8, the compressed air and adhesive tube circuits may be formed by boring out a solid gun head to define said tubes in the form of apertures in said head. The same end may be attained by forming the air circuit, as shown in Fig. 11, in the form of hollow tubes **62**, **62'**, **63**, **63'** with an air pressure line **65** connected thereto, the tubes being arranged in connected and criss-cross relation and having clean out plugs **64** disposed in and closing the free ends thereof. Likewise, the adhesive circuit may comprise hollow tubes **72**, **72'**, **73**, **73'** arranged in connected and criss-cross relation, with clean out plugs closing the free ends of the tubes, and an adhesive line **75** connected to the adhesive circuit. The gun head **11*a*** may be in the form of a hollow casing, shown in dotted lines, secured to the tubes.

It has been found that the spray gun of the invention is extremely light in weight and highly maneuverable. This is an important consideration in the practical application of insulation materials, reducing worker's fatigue and facilitating accuracy and speed of application.

The spray gun embodying the invention may be provided, as shown in Fig. 7, with a material pipe **42** fixed to the spray gun head in registry with the aperture **36** therein; a clamp ring **43** may be fixed to said pipe **42** and to the air pressure and adhesive lines **15** and **25**. Flexible connections **15*a***, **25*a*** and **42*a*** may be provided below said clamp, connected to sources of supply for the members **15**, **25** and **42** respectively. While I have shown and described the nozzle **30** as composed of several parts, the same may be formed as a unitary member containing the essential structural features noted. However, it is found, in practice, that the structure shown in Fig. 5 is highly practical, providing for accurate alignment of the elongated slotted ends **39** of the nozzles to obtain the objective of the invention. In order to align the nozzles **30**, **30*a***, **30*b*** and **30*c*** to direct the same to a common imaginary point of convergence so that they will project the flat walls of adhesive for convergence on the stream **35'**. To attain the box-like effect above noted, said nozzles are disposed, as above stated, in the gun head at an acute angle to the axial line **35** of the stream of insulation material projected from the spray gun. For that purpose, the threaded recesses **51** in the gun head **11** may be disposed at the desired angle to provide for the automatic angular axial alignment of the nozzles, or the gun head **11** may, as shown in Fig. 12, be provided with a concave or angular upper face **41** which will facilitate the boring of the recesses **51*a*** at the desired angle. In the arrangement shown in Fig. 12, the recesses are bored at substantially right angles to the upper face **41** of the gun head.

As above noted, three or more nozzles are used in carrying out the invention. Four are shown in Fig. 1; five or more may be similarly used. Three nozzles **30*d***, **30*e***, **30*f*** are shown in Fig. 13.

While a generally rectangular disposition of air and adhesive tube circuits is convenient, a triangular arrangement may be used, in the gun head, as shown in Fig. 14, the tubes **82**, **82'** and **83** being connected with and criss-crossing each other, the free ends of the tubes being closed by plugs. A similar tube circuit consisting of three tubes **84** connected with and criss-crossing each other, may, in the form shown in Fig. 14, be provided for the other circuit.

The positions of the nozzles on the gun head may be adjustable (Figs. 4*a*, 4*b*) so as to permit the operator to readily and accurately adjust the nozzles so that the adhesive walls projected therefrom will wet the stream of insulation fibers at precisely the distance from the gun head required by the job at hand.

As shown in Fig. 4*b*, the nozzles **30*g*** may be adjusted to dispose the axial line of the nozzle head **37*a*** from a given or medial position (indicated at **34*a***) inwardly to the position shown in Fig. 4*b* and indicated by axial line **34*b***, where it is desired to apply the insulation material at relatively short range, better wetting the fibers of such material. Conversely, the nozzles may be adjusted to dispose the nozzle heads outwardly (indicated by axial line **34*c*** of Fig. 4*b*) to wet the fibers of the stream of insulation material at a greater than normal distance from the gun head.

The nozzle head may be rotatably and adjustably disposed on the gun head, for the purpose mentioned, as exemplified in Fig. 4*b*. The base **31*a*** of nozzle **30*g*** is there shown provided with a circular recess **48** opening into the upper end thereof and rotatably receiving the complementary circular lower end **44** of the nozzle head **37*a***. Cap **40*a*** is carried by the nozzle head and slid-

ably engages the upper end of the base 31*a*. The parts may be locked in adjusted position by nut 45, bearing on the cap 40*a* and threadedly engaging the nozzle head as at 46.

In the form shown in Fig. 4*a*, the upper end 47 of the nozzle base is offset; the position of the nozzle head thus may be readily and accurately adjusted on rotation of the nozzle base. A corresponding variation in the disposition of the projected adhesive walls is effected. The nozzle base of Fig. 4*a* may be used with the other nozzle parts shown in Fig. 6.

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

1. In an apparatus for spraying particles of insulation material upon a surface, a spray gun head comprising a unitary body having upper and lower surfaces and marginal edge faces, said body being formed with a central opening constituting a discharge opening for insulation material, there being upper and lower continuous conduits in said body surrounding the discharge opening, each of said conduits consisting of straight sections extending entirely through the body in a horizontal plane transversely of each other, and in spaced relation to their ends having portions meeting in intersecting and communicating relation to each other, said sections having their ends opening through side edge faces of the body and closed by removable plugs, and

nozzles carried by said body and projecting upwardly therefrom, each of said nozzles being formed with a bore extending longitudinally throughout the length of the nozzle and having its lower end open and communicating with the lower conduit, and a side port in each nozzle communicating with the bore thereof and the said side port communicating with the upper conduit.

2. The structure of claim 1 wherein the body consists of a solid block and the conduits each consists of bored passages extending entirely through the body.

3. The structure of claim 1 wherein the body consists of a hollow shell and the straight sections of the conduits each consists of preformed straight tubes.

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