Jan. 20, 1925. 1,523,855

W. BARROWS

SPRAYER

Filed April 12, 1923 3 Sheets-Sheet 1

Fig. 2.

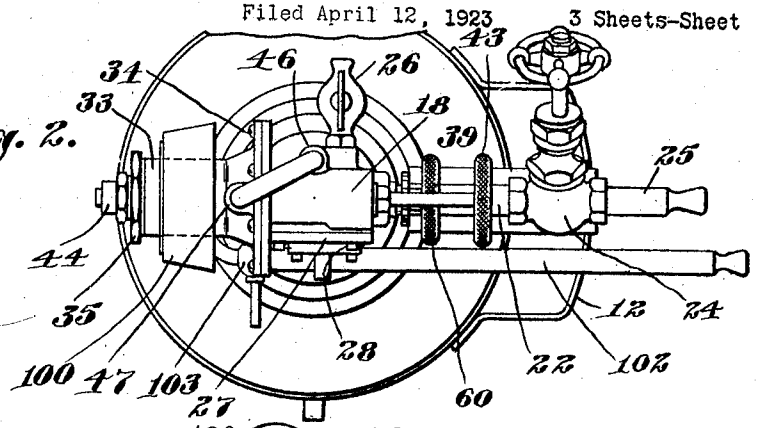
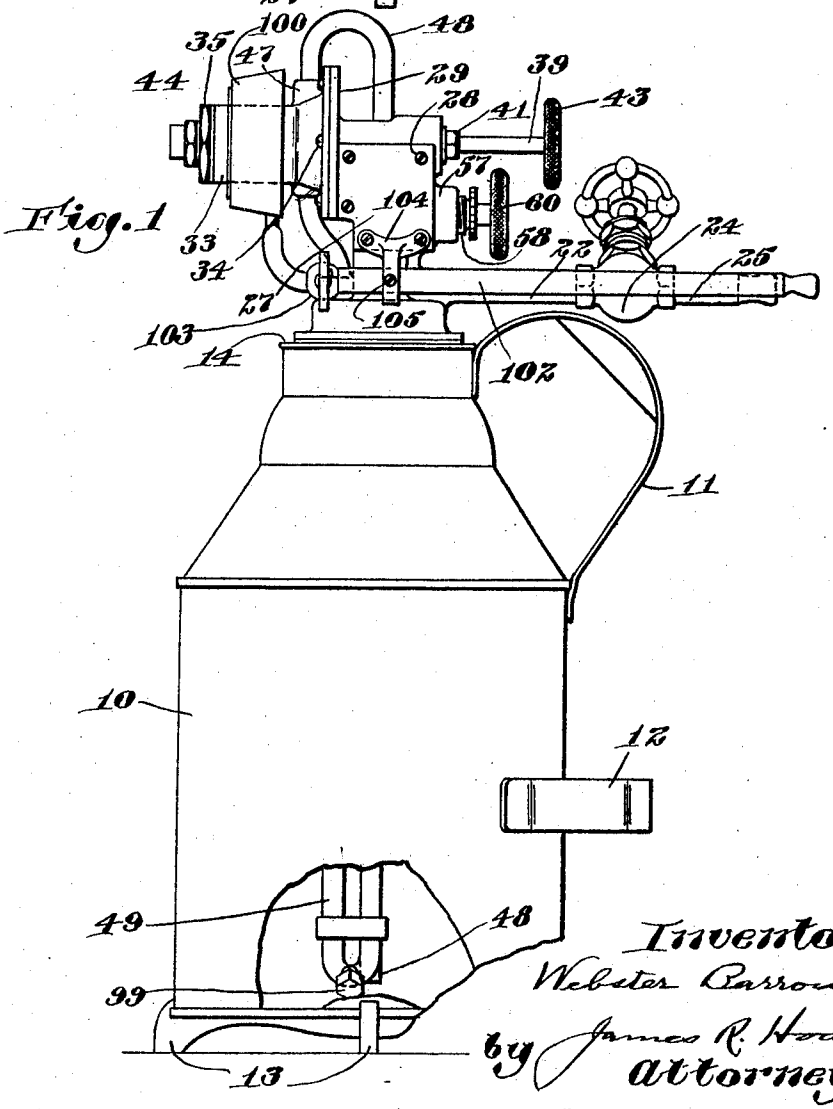


Fig. 1



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1,523,855

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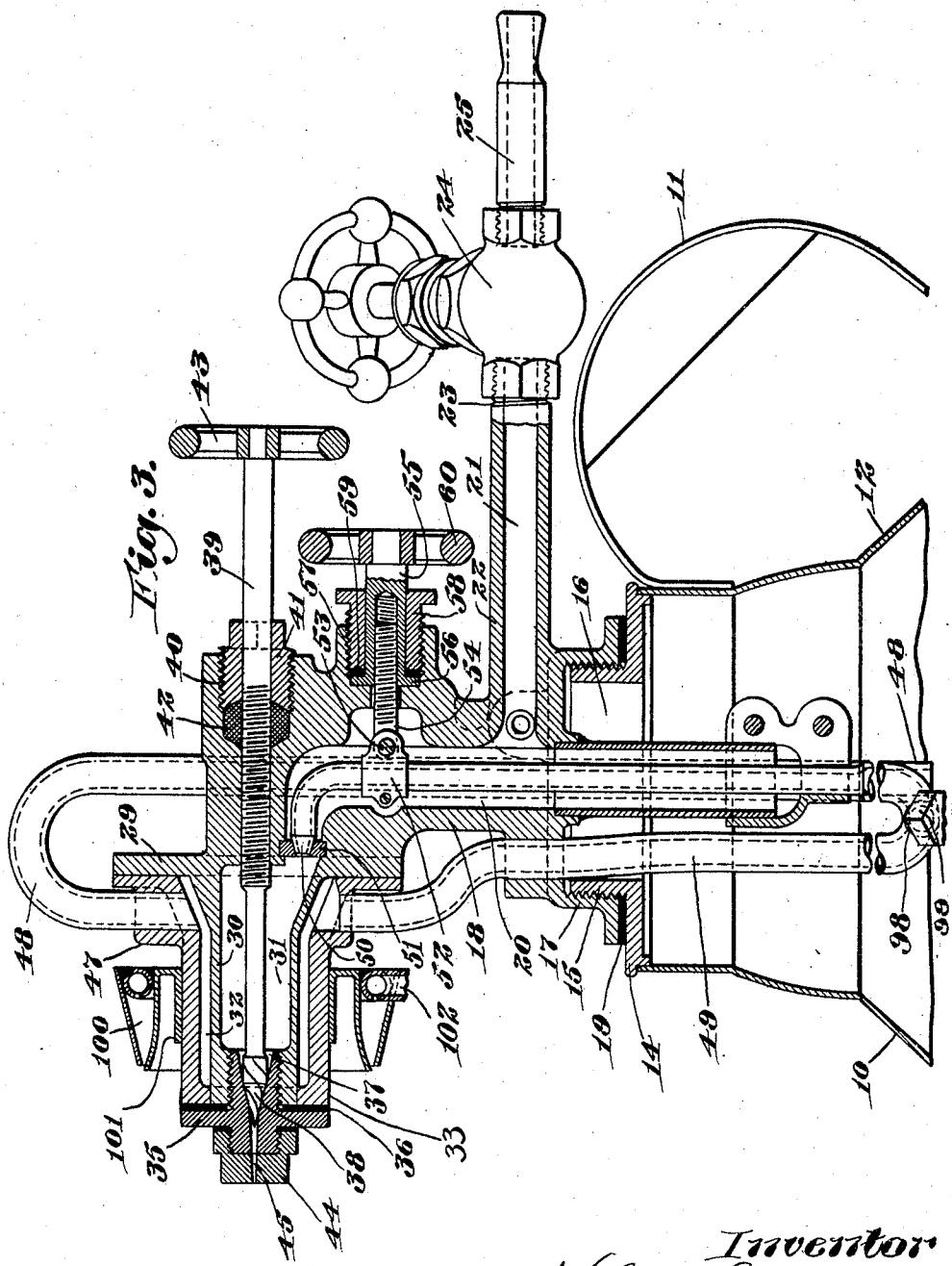


Fig. 3.

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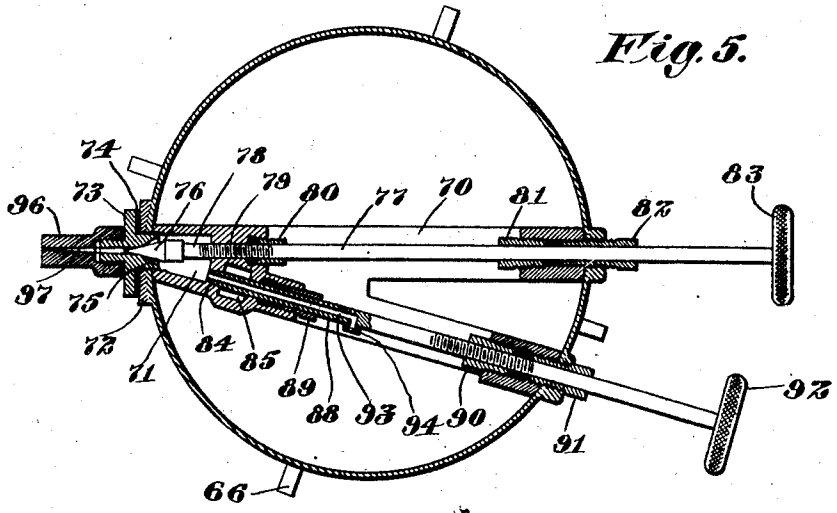
Jan. 20, 1925. 1,523,855

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SPRAYER

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Fig. 5.



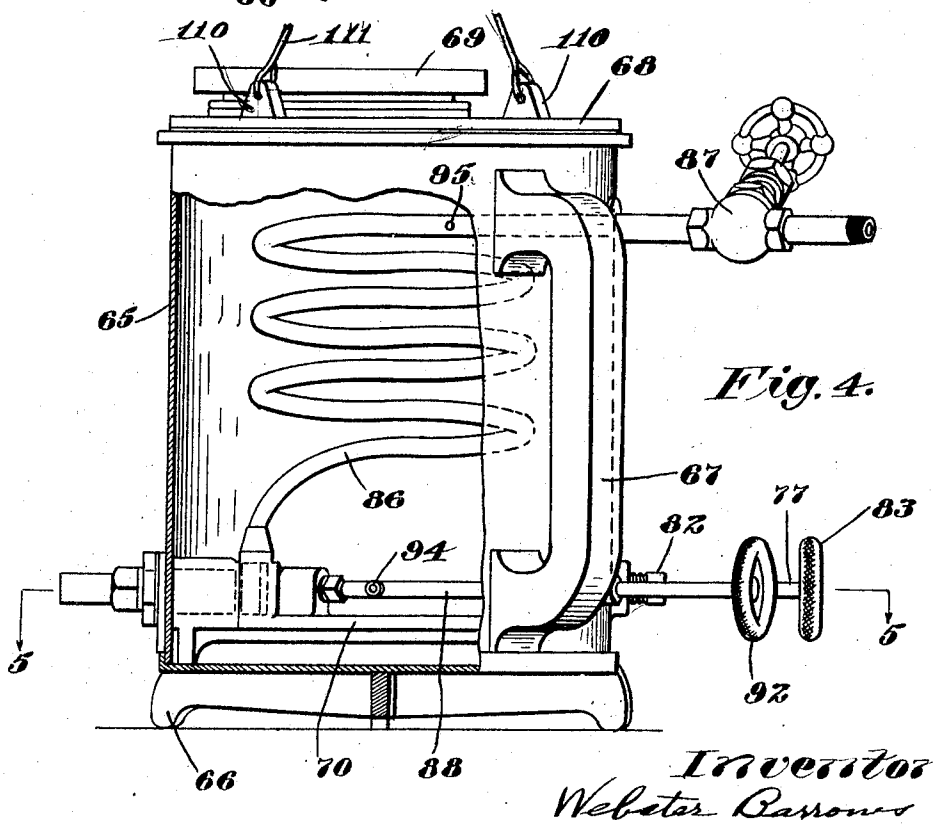


Fig. 4.

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Patented Jan. 20, 1925. 1,523,855

UNITED STATES PATENT OFFICE.

WEBSTER BARROWS, OF MALDEN, MASSACHUSETTS.

SPRAYER.

Application filed April 12, 1923. Serial No. 631,555.

To all whom it may concern:

Be it known that I, WEBSTER BARROWS, a citizen of the United States, and a resident of Malden, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Sprayers, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My present invention relates to sprayers, and more particularly to an improved sprayer for cementitious substances which will liquefy under heat.

My present invention is designed particularly to facilitate the taking of masks or molds for the use of sculptors or the like, and reference is hereby made to the patents of Hector L. Moreau 996,783 and 996,784, granted July 4, 1911, where is described and claimed the process of making sculptors' molds and sculptors' molds respectively, and to the patent granted to myself and Hector L. Moreau, 1,020,679, dated March 19, 1912, wherein is disclosed processes of making copies of certain objects in solid material, and my present invention is capable of conjoint use with the processes and apparatus disclosed in said patents.

One of the main difficulties in carrying out the processes and building up the molds described and claimed in the patents above referred to has been the crude methods and apparatus necessarily employed in applying the preliminary wax or other cementitious coating to the object of which it is desired to obtain a replica. To obviate the difficulties heretofore experienced and to render more easy and certain of practice the processes disclosed in the patents above referred to, I have designed the subject matter of the present invention. My present invention relates, therefore, to an improved apparatus whereby any cementitious substance which will liquefy under the influence of heat, such as tar, sealing wax, bees wax, paraffin, gelatine, glue, or the like, may be applied to the material of which it is desired to obtain a replica by means of a mold in the form of a spray and this preliminary coating of cementitious material may be applied to any article or object in a fine coat of any desired thickness without possible injury or distortion of the surface of material of the article or object. The object of my invention, therefore, is an improved sprayer or atomizer for cementitious materials that are capable of being liquefied on the application of heat.

In carrying out the object of my present invention I arrange a spraying attachment consisting essentially of an air chamber, mixing chamber, and spraying nozzle in such position relative to a container for the substance to be sprayed that a portion of such substance may be made to circulate about the mixing and air chambers to maintain such chambers at approximately the same heat as that of the substance to be sprayed and utilize an air pressure to force such material from the container to the mixing chamber and utilize the same source of air pressure for forcing the mixture of air and material through the nozzle. I find it advantageous to build the spray nozzle of practically a combination of two nozzles constituting an outer and an inner one, the inner one of which has a relatively large opening, making a relatively large or coarse spray, and the outer nozzle with a small opening to effect the making of a small spray. Further, I arrange the control of the sprays with a needle valve having a substantially helical point which induces a circular motion in the spraying material projected through the nozzle by the air pressure, which construction has the advantage of breaking up the spray into exceedingly fine particles, resulting in the spreading of the spraying material over a relatively large area and a fine coat.

Other novel features of the construction and arrangement of parts comprising my apparatus will appear as the description of the invention progresses.

In the accompanying drawings illustrating a preferred embodiment of my invention as applied to a spraying material container,

Fig. 1 is a side elevation;

Fig. 2 is a plan of Fig. 1;

Fig. 3 is a vertical longitudinal sectional elevation of my improved spraying head;

Fig. 4 is a side elevation, partly in section, of a modification, and

Fig. 5 is a sectional plan view on the line 5—5 of Fig. 4.

Referring to the drawings, 10 designates a container for containing a heated mass of

spraying material such as wax, sealing wax, paraffin, or any other suitable cementitious material that liquefies on application of heat, this container being supplied at its top with a handle 11 by means of which the apparatus may be carried, and with a side bail 12, the container 10 resting on feet 13. Secured to the open top of the container 10 by soldering or brazing, or in any other suitable manner, is a flange 14 provided with a threaded upwardly extending portion 15 defining a passage 16 leading to the interior of the container. Onto the threaded portion 15 is adapted to be screwed the interiorly threaded lower end 17 of the spraying head 18, the packing ring 19 being employed between the member 17 and the portion 14 for maintaining a tight joint between the container 10 and the spraying head 18. This spraying head 18 is provided with a centrally arranged vertically extending passageway 20, as shown, and connecting with the lower end of this passageway and extending laterally therefrom is a passageway 21 formed in the member 22, this member 22 being formed integral with the spraying head 18. The outer end of this member 22 is threaded at 23 to receive one end of a control of the valve 24, the other end of this valve being connected to a short length of pipe 25 which may, in turn, be connected to any desired source of preferably air pressure. Screwed into the side of the spraying head 18 and communicating with the passage 21 is a pet cock 26 and by means of which it is possible to relieve the pressure in the container 10. The passage 20 connects with the outside of the spraying head 18 and is normally closed by means of a plate 27 secured to the praying head 18 by screws 28. By the use of this plate 27 the interior of the passage 20 is accessible for the insertion, removal, and adjustment of various elements to be hereinafter described.

The upper portion of the spraying head 18 is provided with a vertical flange 29 from the center of which extends horizontally outward a member 30 that is hollow and defines a mixing chamber 31. Surrounding the member 30 and spaced apart therefrom to define an annular chamber 32 is a member 33 secured on its inner end to the flange 29 by screws 34, this annular passage 32 constituting a heating jacket that surrounds the mixing chamber 31. Screwed into the end of the member 30 is an inner spray nozzle 35, a packing washer 36 being inserted between said inner spray nozzle and the ends of the members 30 and 33 to maintain tight joints therebetween. The spray nozzle 35 is provided with a tapered passage 37 therethrough with which cooperates the helical valve 38 formed on the end of a threaded valve stem 39 that screws into and through the spraying head 18, as shown, the spraying head being threaded for this purpose and also being provided with an internally threaded portion 40 that receives a packing nut of stuffing box 41, packing 42 being utilized to maintain a tight joint between the valve stem 39 and the spraying head. This valve stem 39 is provided with a usual handle 43 by means of which the same may be manipulated. Screwed onto the outer end of the inner spray nozzle 35 is an outer spray nozzle 44 provided with a tapered passage 45 in alinement with the tapered passage 37 of the inner spray nozzle.

The spraying head 18 and the member 33 are each provided with bosses 46 and 47 respectively, which bosses are perforated to receive the U-shaped tubular member 48, one end of which terminates at the annular chamber 32 while the other end passes through the perforation in the boss 46 and terminates at a point slightly above the bottom of the container 10. The lower side of the member 33 and the spraying head 18 are also perforated to receive a tubular member 49, one end of which passes upwardly through the spraying head 18 and terminates at the annular chamber 32 while the tubular member 49 is bent intermediate its ends into substantially U-shaped form, the lower edge of the U-shaped portion terminating at a point slightly above the bottom of the container 10 while the other end passes upwardly through the passage 20 and is bent at right angles and tapered, as shown at 50, this tapered portion acting as a valve stem and seats in the correspondingly tapered seat of the member 51 secured in the spraying head 18 and acting as a wall separating the passage 20 from the mixing chamber 31. Secured to the tubular member 49 adjacent the right angled portion thereof is a clamp 52 to one side of which is pivotally attached by means of screw 53 the inner end of a threaded member 54 that cooperates with the threaded valve stem 55. The inner end of this valve stem 55 is provided with an integrally formed flange 56 that engages with a seat formed at the bottom of the internally threaded passage 57 in the spraying head 18, this internally threaded passage having screwed therein a stuffing nut 58, packing 59 being provided between the inner stuffing nut 58 and the outer face of the flange 56. The valve stem 55 is provided with the usual handle 60 and by means of which the same may be manipulated. It is evident, from this latter construction, that rotation of the valve stem 55 in the proper direction will force the tapered end 50 of the tubular member 49 into or out of engagement with the tapered valve seat in the member 51, as may be desired, to allow communication between the passage 20 and the mixing chamber 31.

If we assume the apparatus to be con-

structed as above described, the operation of the same is as follows. It is understood, of course, that the substance to be sprayed may be heated in the container 10 to the proper consistency or may be heated prior to its insertion in the container or in any other manner desired, and further that the compressed air employed for projecting the substance onto the article to be covered may be utilized as it comes from the compressor or container; that is, cold, or may be heated by passing the same through any desired heating apparatus prior to the passage of such air through the valve 24 and further, it is to be understood that I am not limited to the use of compressed air, as any other gas or vapor suitable for the purpose may be employed. Further, that while I find it desirable, and therefore prefer to mix the propelling fluid, such as compressed air, with the substance to be sprayed, such as wax, paraffin, or the like, yet I may, without departing from the spirit of my invention, spray the substance, whether wax, paraffin, or any other desirable material, without mixing the same with air.

We will assume that the substance to be sprayed, as wax, is first heated to the proper degree, poured into the container 10, and the spraying head 18 with all the attachments described screwed onto the top of such container and that the pipe 25 is connected by means of suitable piping to a source of air pressure, all valves being for the moment supposed to be closed. After assuring himself that the valve 26, particularly, is closed, the operator, by opening the valve 24, allows air under pressure to pass through the passage 21 into the passage 20 and downward into the container 10 where the pressure acts on the top of the heated substance which is thus forced up through the pipe 48 into the jacket 32, downward from said jacket 32 into the pipe 49 and thence upwardly through said pipe and into the mixing chamber 31. The air adjusting valve handle 60 and the needle valve handle 43 are now operated to move the tapered end 50 off the seat 51 and the helically grooved valve 38 off the seat 37 respectively, whereupon the air under pressure passing from the passage 20 between the tapered end 50 and the valve seat of said member 51 causes an intimate mixture of the heated material, such as wax, and the air and the continued pressure forces the mixture of air and heated substance through the passages 37 and 45 in the form of an exceedingly fine spray which, owing to the helical grooves in the member 38, is given a circular motion. By removing the outer fine spray nozzle 44, a coarse spray may be obtained, which is preferably after the first preliminary coating is given to the article it is desired to cover. When the article to be coated is covered to the desired extent, the valve 24 is operated to shut off the air supply, the valves 60 and 43 also closed, and the petcock 26 opened to relieve the pressure from the top of the remaining heated material in the container 10.

Referring now to Figs. 4 and 5 which show a modification of my invention, 65 designates a container supported on feet 66, this container being provided with a handle 67 and with a removable top 68, which top, in turn, is provided with a removable cover plate or opening 69 and through which the heated substance may be inserted into the container. Formed on the top 68 are ears 110 to which are secured the ends of a bail 111 and by means of which the entire apparatus may be carried. Secured to the walls of the container and inside such container near the bottom thereof is a member 70 substantially V-shaped in plan, as shown in Fig. 5, and at the point of the V is formed a mixing chamber 71 which communicates with the outside of the container, a perforation being provided in the container for such purpose, and screwed into a flange 72 secured to the outside of such container and into the open end of the mixing chamber 71 is an inner spray nozzle 73, packing 74 being provided between the inner face of the spray nozzle and the outer face of the flange 72. This inner spray nozzle is provided with a tapered passage 75 with which cooperates the tapered valve 76 secured to the end of a valve stem 77 that is provided with a threaded portion 78 screwing into a correspondingly threaded portion 79 of the member 70, a stuffing box 80 being provided for maintaining a non-leakable joint between the mixing chamber and the valve stem 77 and this valve stem extends outwardly through that portion of the wall of the container 65 diametrically opposite the opening that communicates with the mixing chamber 71, a double stuffing box arrangement 81 and 82 being provided for preventing leakage from the interior of the container 65 to the exterior thereof and this valve stem is provided on its extreme outer end with an operating handle 83.

Communicating with the mixing chamber 71 by means of a tapered passage 84 is an air chamber 85, this air chamber being connected by means of a coil of pipe 86 with any suitable supply of air under pressure, a valve 87 in such pipe and exterior of the container 65 being provided for controlling the flow of air under pressure to the air chamber 85. Cooperating with the tapered passage 84 is the tapered end of a valve stem 88 which extends through a stuffing box 89, as shown, the outer end of this valve stem being provided with an operating handle 92. The forward or tapered end of this valve stem is provided with an axial passage 93 that communicates with the right angled passage

94 leading to the interior of the container 65, this passage 94 being ordinarily beneath the surface of the heated substance to be sprayed. In the pipe 86 and at such a point as to be well above the ordinary level of the heated material in the container is an orifice 95 by means of which orifice air is admitted to the container and above the heated material.

On the outer end of the inner spray nozzle 73 is screwed an outer spray nozzle 96 provided with a tapered passage 97 in alinement with the tapered passage 75 extending through the inner spray nozzle 73, such spray nozzles acting in identically the same manners as the inner and outer spray nozzles described with respect to the preferred embodiment shown in Figs. 1, 2, and 3.

The operation of the modification just described is essentially like that described with respect to the preferred embodiment, it being obvious that, in either case, the heated material is admitted to the mixing chamber 71 where it is intimately mixed with air under pressure passing into said mixing chamber and the intimate mixture of air and heated material is sprayed in the form of an exceedingly fine spray through the inner and outer spray nozzles 73 and 96 or through the inner spray nozzle alone, as may be desired.

The pipe 49, at its lowest point, that is, where it is bent into the shape of a U, is provided with a nipple 98 which has screwed thereon a cap 99. After using the apparatus, the valve 24 is closed, the device removed from the container, the air valve 26 then opened, and by removing the cap 99 from the nipple 98, the heated material flows from and frees the pipes and chambers.

While the material is preferably sprayed warm or hot, it is advantageous to have the same cooled as quickly as possible after being sprayed, and to accomplish this desirable result I preferably surround the spray with a circle of air. The means for accomplishing this feature consists of an annular chamber 100 formed on a body 101 that is a sliding fit on the exterior of the member 33, this chamber being connected to the source of air supply by means of the pipe 102. This pipe 102 is provided with a control valve 103. A bracket 104, secured to the plate 27 by screws 28, is provided with a passage through which may slide the pipe 102 in order that the position of the mouth of the annular chamber 100 may be adjusted relative to the spray nozzles. A screw 105 allows the chamber 100 to be held in any desired adjusted position.

While I have necessarily shown and described the preferred embodiments of my invention somewhat in detail, it is to be understood that I may vary the size, shape, and arrangement of parts within wide limits without departing from the spirit of my invention.

Having thus described my invention, what I claim as new is:

1. An improved spraying apparatus for cementitious material, comprising a container, a spraying head mounted thereon, an air chamber and a mixing chamber formed in said spraying head and normally communicating with each other, means for conducting fluid under pressure to the interior of the container, a conduit connecting the interior of the container below the surface of the cementitious material with the mixing chamber, and means for conducting air to the mixing chamber simultaneously with the admission of cementitious material thereto.

2. In an improved spraying apparatus for cementitious material, including a spraying head, an air chamber and a mixing chamber formed in said spraying head and normally communicating with each other, a conduit for conducting cementitious material through the air chamber and into the mixing chamber, and means associated with said conduit for adjusting the flow of fluid from the air chamber to the mixing chamber simultaneously with the cementitious material.

3. The combination in an improved apparatus for cementitious material of a mixing chamber, a heating jacket surrounding said chamber, a conduit extending from a source of supply of heated cementitious material to the heating jacket, and a conduit leading from said heating jacket for conducting heated cementitious material to the mixing chamber.

4. The combination in an improved spraying apparatus for cementitious material of a mixing chamber wherein heated cementitious material and fluid under pressure are intimately mixed, a spray nozzle secured to the exit end of the mixing chamber, a valve seat formed in such spray nozzle, and a helically grooved needle valve associated with said valve seat for controlling the flow of intimately mixed heated cementitious material and fluid under pressure through the spray nozzle and whereby a rotary motion is imparted to said mixture of cementitious material and fluid under pressure.

5. The combination in an improved spraying apparatus for cementitious material of a mixing chamber wherein heated cementitious material and fluid under pressure are intimately mixed, a spray nozzle secured to the exit end of said mixing chamber, a valve seat formed in said spray nozzle, a helically grooved needle valve associated with the valve seat and controlling the flow of intimately mixed heated cementitious material and fluid under pressure through said spray

nozzle and whereby a rotary movement is imparted to such mixture, and a fine spray nozzle secured to the outer end of the first said spray nozzle and provided with a bore in axial alinement with the bore of the first said spray nozzle whereby an exceedingly fine spray of rotatably propelled mixture of cementitious material and fluid under pressure is obtained.

6. An improved spraying apparatus for spraying heated cemetitious material, comprising a container, a spraying head removably secured thereto, an air chamber and a mixing chamber formed in said spraying head, means for controlling the flow of heated cementitious material from the mixing chamber, a heating jacket surrounding said mixing chamber, a conduit extending from a point beneath the surface of the heated cementitious material within the container and extending upward through the spraying head and connecting with the heating jacket, a conduit extending from said heating jacket downward through the spraying head into the container and thence upwardly through the air chamber and communicating with the mixing chamber, a partition separating the air chamber from the mixing chamber, a valve seat formed in said partition, a valve formed on the end of the last named conduit and controlling the flow of air under pressure from the air chamber to mixing chamber, and means extending through the spraying head for controlling the valve and valve seat.

7. An improved spraying apparatus for spraying a mixture of heated cementitious material and fluid under pressure, comprising a container, a mixing chamber and an air chamber, means for controlling the connection between said chambers, a spray nozzle attached to the mixing chamber, means for utilizing a single source of fluid under pressure for supplying pressure to force the heated cementitious material into the mixing chamber and for furnishing air from the air chamber to said mixing chamber simultaneously whereby the heated cementitious material and fluid under pressure are intimately mixed prior to their projection through the spray nozzle.

8. An improved spraying apparatus for cementitious material, including an air chamber and a mixing chamber, means for conducting fluid under pressure from and through the air chamber into the mixing chamber simultaneously, a spray nozzle secured to the mixing chamber, means for imparting a rotary movement to the mixture of fluid and cementitious material, and means for surrounding the spray nozzle with a circular spray.

9. In an improved spraying apparatus for cementitious material, including a spraying head, an air chamber and a mixing chamber formed in said spraying head and normally communicating with each other, a conduit for conducting cementitious material through the air chamber and into the mixing chamber, means associated with said conduit for adjusting the flow of fluid from the air chamber to the mixing chamber simultaneously with the cementitious material, and means for surrounding the spray nozzle with a circular spray.

10. In an improved spraying apparatus for heated cementitious material, comprising a container, a spraying head mounted thereon and provided with a plurality of spray nozzles arranged in series, means for utilizing fluid under pressure for forcing the heated cementitious material from the container to the spraying head and for simultaneously projecting such heated cementitious material through the spray nozzles, and means for surrounding the spray nozzles with a circular spray.

In testimony whereof, I have signed my name to this specification.

WEBSTER BARROWS.