Dec. 31, 1935. W. A. FRITZ 2,025,974

MIXING NOZZLE

Filed Dec. 24, 1931

Fig. 1.

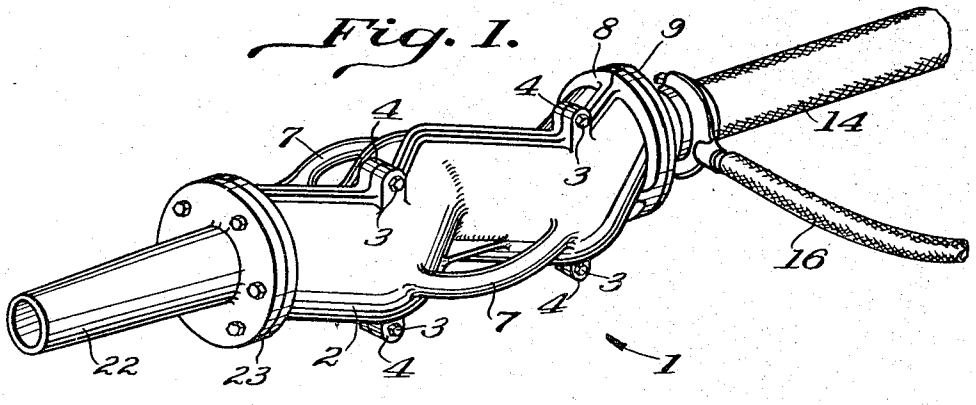


Fig. 2.

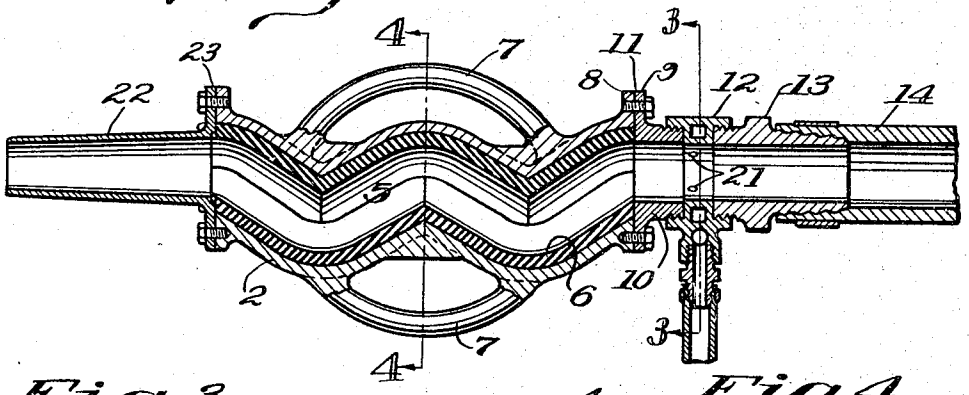


Fig. 3.

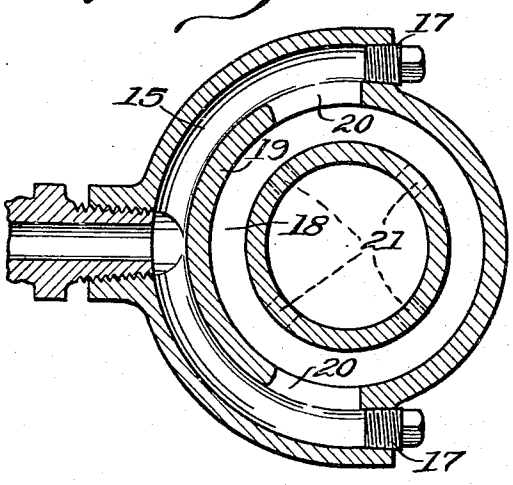
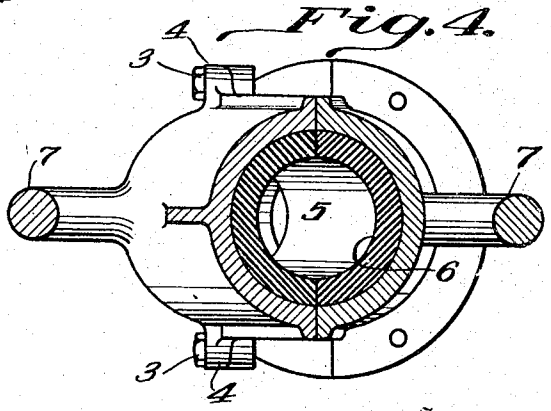


Fig. 4.



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MIXING NOZZLE

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1 Claim. (Cl. 91—44)

This invention relates to improvements in mixing nozzles and has particular reference to nozzles of the type employed in the spraying of cementitious mixtures or materials whereby the latter are advanced under pressure through confined conduits or pipe lines and deposited on walls or surfaces which are adapted to be protected or strengthened by the application of such materials.

At present, in applying cementitious materials by the spray method to walls or other surfaces, it is customary to arrange a manipulatory nozzle at one end of a hose or conduit through which regulated proportions of sand and cement are advanced under pressure, the nozzle, at its point of connection with the conduit, being provided with a water inlet or ring by which water under pressure is introduced into the advancing sand and cement mixture and then forced through the nozzle under pressure and applied in the form of a protective or strengthening layer on desired wall surfaces after being expelled from the nozzle. In this operation, I have observed that the water piped to the sand and cement mixture does not uniformly and intimately combine or commingle with the solid materials to produce a plastic cementitious mixture when discharged from the nozzle. In other words, there is a decided tendency, often repeated, for the sand or cement to strike the wall surface in a relatively dry state, with the result that where sufficient water is not present, the sand and cement pockets in a relatively dry state, producing an inefficient condition which requires careful inspection, considerable repair or patch-work to build up to the required depth a uniform cementitious covering and is generally unsatisfactory for these and other reasons.

I attribute this condition largely to the fact that in prior nozzle constructions, there does not take place, before the discharge of the materials therefrom, a complete and intimate mixture or commingling of the several ingredients which are merged at the nozzle to produce the desired uniformity in the plastic condition of such materials prior to their application to a wall surface. It is, therefore, an outstanding object of the present invention to provide an improved nozzle construction especially adapted for the spraying of cementitious mixtures in an effective and efficient manner on wall surfaces, and wherein the construction of the nozzle is such that before the materials are discharged from the outlet of the nozzle, there takes place a turbulent flow or passage of the several materials entering into the cementitious mixture so that the latter is thoroughly agitated and worked to produce a plastic mixture of uniform properties, whereby when sprayed from the nozzle, such materials will properly adhere to and unite with the wall surfaces to be protected thereby, specifically overcoming the objection above noted in standard nozzle construction.

It is another object of the invention to provide an improved nozzle of the character stated wherein a mixing chamber of zigzag form is utilized, the said chamber or passage, due to its tortuous form, serving to effect the desired mixing of the ingredients entering into the composition of the cementitious mixture discharged from the nozzle so that such materials will possess the requisite uniformity or plasticity when first applied to a wall surface.

With these and other objects in view, which will appear as the description proceeds, the invention consists in the novel features of construction, combination of elements and arrangements of parts hereinafter fully described and pointed out in the appended claim.

In the accompanying drawing:

Fig. 1 is a perspective view of a mixing nozzle for the spraying of cementitious materials, the said nozzle being constructed in accordance with the features of the present invention;

Fig. 2 is a horizontal sectional view taken through the nozzle, disclosing more particularly the tortuous or zigzag form of its mixing chamber or passage;

Fig. 3 is a vertical transverse sectional view taken on the plane disclosed by the line 3—3 of Fig. 2, and illustrating the construction of a water ring used in subjecting the liquid into the materials entering the mixing nozzle;

Fig. 4 is a similar view taken through the mixing chamber of the nozzle on the line 4—4 of Fig. 2.

Referring more particularly to the accompanying drawing, my improved mixing nozzle is designated in its entirety by the numeral 1. In the specific form of the nozzle herein selected for illustration and description, it includes a two-part split casing structure designated at 2. This casing consists of duplicate halves having abutting edges which are adapted to be securely united by means of threaded bolts 3 which cooperate with lateral ears 4 integrally formed with the registering casing halves, whereby such halves are rigidly secured in connected relationship. The casing structure thus formed provides a mixing passage or chamber 5 which, as shown particularly in Fig. 2, is of zigzag formation, producing a tortuous path for the material travel-

ling therethrough, and being composed of a plurality of relatively angular sections. The chamber or passage 5 has its interior walls provided with a lining 6 composed of rubber or other compressible material. The lining may be formed in sections or halves corresponding with the construction of the casing 2, the wavy curvilineal form of the casing rendering this construction necessary. The lining serves to reduce wear on the metallic walls of the casing and greatly prolongs the life of the tool. Handles 7 may be integrally formed in the casing halves and are adapted to be grasped by the operator to facilitate the manipulation of the nozzle.

The rear end of the casing structure is provided with a circular flange 8 with which engages a corresponding flange 9 formed upon a collar 10, the flanges 8 and 9 being mounted or otherwise connected as at 11. The small end of the collar 10 is externally threaded and is received within the internally threaded end of a water ring 12, the other end of said ring being threaded for the reception of a coupling sleeve 13, which is used to connect the flexible sand and cement conduit 14 with the water ring and thereby with the nozzle proper. The construction of the water ring has been best disclosed in Fig. 3 wherein it will be noted that the ring is formed to constitute a casting in which is embodied an arcuate chamber 15, water being introduced into the chamber 15 by way of a hose 16. The ends of the chamber 15 are closed by means of threaded plugs 17. In the water ring, the chamber 15 is separated from an annular chamber 18 by means of a partition 19 and openings 20 are provided in said partition to permit of water flow from the chamber 15 into the chamber 18. The chamber 18 annularly surrounds the main opening of the ring and water flows under pressure from the chamber 18 into the main opening or passage of the ring through the radially disposed ports 21.

Sand and cement in mixed relationship and desired relative proportions is advanced through the conduit 14 under pressure. This pressure may vary and may be approximately of the order of from 40 to 50 pounds per square inch, depending upon the length of the hose or conduit and the proportions and quantity of the material advanced therethrough. Water, for example, under a pressure of about 25 pounds per square inch is advanced into the water ring and thence through the ports 21 into intimate contact with the sand and cement passing through the ring following discharge from the conduit 14. The water thus mixes with the sand and cement but the mixture is not satisfactory to permit of direct application to a wall surface and therefore the present invention resides primarily in the provision of the zigzag mixing passage provided in the casing structure 2, which is of such form that the cementitious mixture, in traversing the casing structure, is agitated back and forth and a certain degre of turbulence applied thereto whereby the water and the remaining ingredients of the mixture are thoroughly commingled and the mixture, upon being discharged from the casing structure, is substantially uniform in plasticity throughout its entire mass. The outer end of the casing structure is provided with the usual nozzle 22, which is mounted or otherwise secured as at 23 to the forward end of the casing structure 2. In operation, the tool is manipulated in the usual manner so that the cementitious mixture issuing from the outer end of the nozzle may be sprayed or otherwise directed upon the surface or surfaces to be covered with the cementitious mixture to a desired depth. I have found that by mixing the ingredients of the mixture in the manner specified, said mixture when discharged from the nozzle will readily and firmly adhere to the surfaces upon which it is directed, eliminating the so-called soft or sand spots produced by the customary type of nozzle. This permits of greatly accelerated speed of application and, in addition, provides for better and stronger protection of the objects or surfaces upon which the cementitious material is applied.

What is claimed is:

A mixing nozzle for a spraying cementitious material comprising a casing divided into two longitudinally extending sections secured together to form a passage, the longitudinal center line of which forms a W, a resilient lining for said passage, a conduit for introducing sand and cement under pressure into the inlet of said passage and a discharge nozzle communicating directly with the outlet of said passage.

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