Nov. 17, 1925. 1,562,194

J. V. SCHAEFER

NOZZLE

Filed Feb. 10, 1923

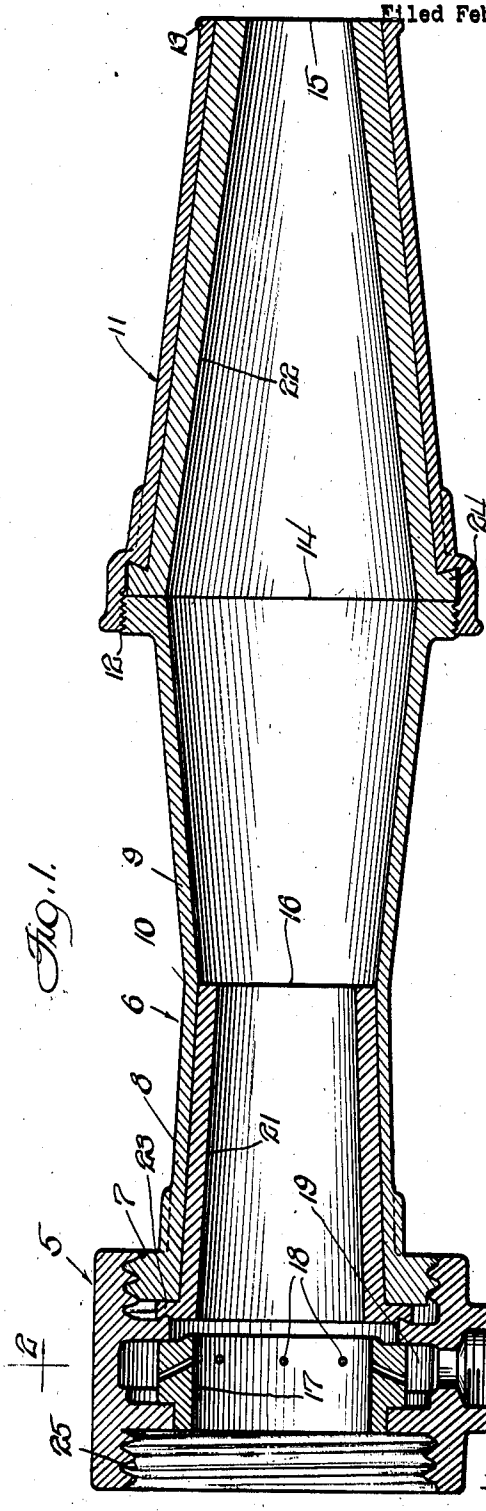


Fig. 1.

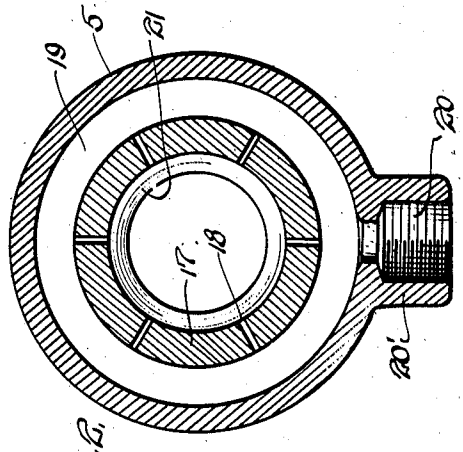


Fig. 2.

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UNITED STATES PATENT OFFICE.

JOHN V. SCHAEFER, OF CHICAGO, ILLINOIS, ASSIGNOR TO CEMENT GUN CONSTRUCTION CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

NOZZLE.

Application filed February 10, 1923. Serial No. 618,210.

To all whom it may concern:

Be it known that I, JOHN V. SCHAEFER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Nozzles, of which the following is a specification.

This invention relates to improvements in nozzles and has especial reference to mixing nozzles.

The nozzle about to be described is especially adaptable for use with a so-called "cement gun", such as that disclosed in United States Letters Patent No. 991,814, granted to Carl E. Akeley, May 9, 1911, in the use of which sand and cement are mixed together and with water at the time when they are projected from the end of the nozzle into the atmosphere and during the time when they are moving thru the atmosphere and at the point of application.

In the present invention I provide means within the nozzle to effectuate the mixing operation by causing the comminuted material to deviate from its normal axial course by taking generally resultant lateral paths, on either side of the axis of the flowing stream and to cause alternate, acceleration and retardation of the stream in its passage thru the nozzle, to cooperatively more thoroughly intermingle the particles of comminuted material and to expose every particle thereof to more intimate contact with the associated water.

Another object of the invention is to provide an improved nozzle consisting of a plurality of cone-like hollow sections with like ends of adjacent sections connected together thereby forming alternately contracted and expanded openings and terminating with a contracted end, said sections arranged to be conveniently separated for purpose of cleaning.

Other objects and advantages will readily appear from a consideration of the specification when taken in conjunction with the drawings forming a part hereof, wherein:—

Fig. 1 shows an axial longitudinal central section.

Fig. 2 is a transverse section taken on line 2—2 of Fig. 1.

In both views the same reference characters indicate corresponding parts.

The invention contemplates the use of a plurality of tapered sections, some of which are readily separable by, preferably, threaded connection and the nozzle terminating, preferably, for the purpose described, in a contracted end so that a stream projected therefrom, will flow at relatively high velocity or at a velocity higher than it is flowing when it is introduced into the nozzle.

In the drawing 5 is a threaded fitting into which a two-section member 6 is secured by threaded connection, at 7. The member 6 consists in integral formation of two sections 8 and 9, joined at their smaller ends at 10 to which point they converge, at their smallest diameters, their larger diameters being at their outer terminal ends, respectively.

Section 9 is connected by threaded means to another tapered section 11, at 12, with their larger ends so connected together and the smaller end 13 of section 11 serving as the terminal of the nozzle.

The nozzle of the drawing has an area of opening at 14, about eight times the area of the opening at 15 and the area at 14 is about four times that of the opening at 16. This has given very good results.

The relative speed of the stream passing thru the nozzle will be varied as it passes the points where the changes in area occur, and these conditions uniformly prevail throughout the entire nozzle.

The more ponderable material carried in the stream will be bombarded from one side to the other owing to the converging walls, thus causing thorough mixing conditions.

The fitting 5 contains a ring 17 having forwardly projecting, spaced openings 18 communicating with an annular opening 19 into which water under pressure is admitted thru the threaded opening 20 which is to be connected by a pipe or hose to a suitable source of water supply.

When the nozzle is to convey comminuted abrasive material such as sand, granular stone, granite, or the like, it is well to line those sections of the nozzle in which the stream approaches its smaller end as sections 8 and 11 with linings 21 and 22, respectively. These linings may have integral flanges 23 and 24, respectively, which serve as packing rings in the joints between the respective sections and, furthermore, the flanges when thus held prevent the linings from leaving the nozzles.

The fitting 5 is provided with a threaded

opening 25 by which to connect the nozzle to a hose or conduit for the material to be mixed within the nozzle.

It is quite important to have the nozzle sections of proper taper, especially the outwardly flaring section 9. If the angle of taper of section 9 be very much greater than the natural expansion of the stream, or as shown in the drawing, there will be accumulation of material in section 9, near the smaller end 16, from time to time, owing to a tendency to the formation of a vacuum at this point by the smaller flowing stream. The result is that this mass of accumulated mortar will be intermittently discharged from the end of the nozzle, producing an effect known as "spitting" which interrupts the uniform operation of the device and is very undesirable. If the angle be much less than five degrees, as shown, or less than the natural expansion of the stream, then the abrasive effect of the sand will be destructive to the metal part of the section. This latter effect may, to an extent, be eliminated by lining section 9 with a soft rubber liner, similar to the liners 21 and 22.

The liners, however, interpose more resistance to the flowing stream than desirable. In sections 8 and 11 wherein the stream is caused to be contracted they are practically necessary, as they serve as resilient surfaces to cause rebound of the more material components of the stream and assist greatly in the mixing operation.

When section 9 conforms to an angle of about five degrees, with respect to its axis, the stream will move in lines substantially parallel with the inner surface of this section, and the abrasion of said surface will be reduced to a minimum, and a smooth, even flow of the intermingled particles of the stream will result.

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

A nozzle having a plurality of adjoining sections, each section having a uniformly tapered bore, with alternate sections tapered in the same direction and arranged to contract and alternately expand a stream flowing therethrough; relatively soft linings for said converging sections and a screw joint at each larger end of said contracted sections adapted for connection with another section.

In testimony whereof I hereunto subscribe my name.

JOHN V. SCHAEFER.