Feb. 4, 1941. L. LANZA 2,230,690

BLAST GUN

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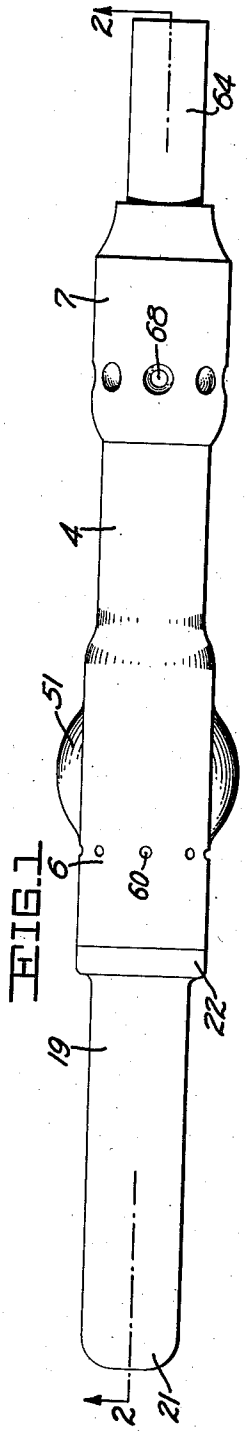


FIG. 1

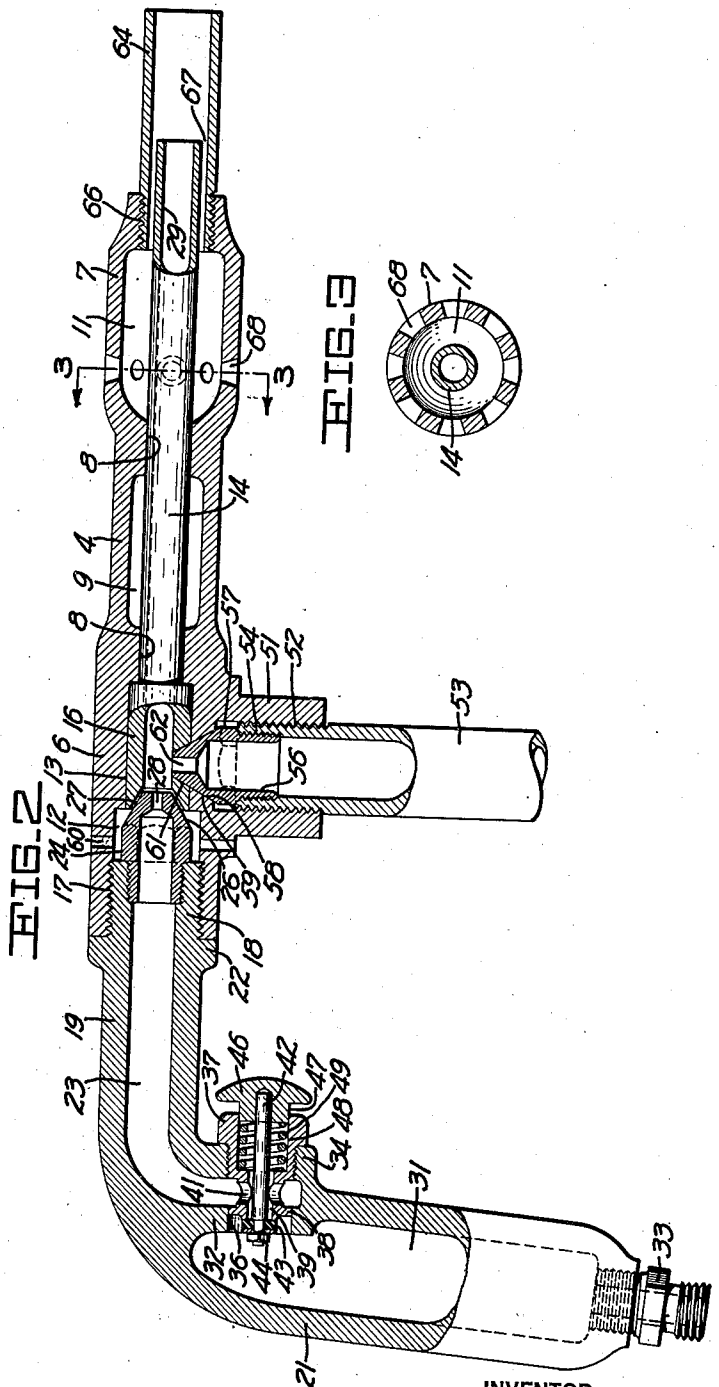


FIG. 2

FIG. 3

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BLAST GUN

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1 Claim. (Cl. 51—11)

This invention relates to devices for admixing particles of matter with a stream of fluid and has particular reference to such a device useful in sand blasting.

It is an object of the invention to provide a multi-purpose tool particularly designed for use in small industrial shops, which will perform, when connected with a source of compressed air, numerous blowing or suction operations that heretofore required the use of a large assortment of separate tools each designed for a specific purpose.

Another object of the invention is to provide a gun for admixing with a stream of air materials, such as sand, which is materially simplified in construction over those now on the market thereby making its production cost very low and permitting it to be sold at a price which is well within the reach of smaller industrial shops or home-owners.

A further object of the invention is to provide, in a device for admixing air and materials such as sand and for conducting the admixed materials through a discharge duct, means in the discharge duct for introducing, into the admixture, additional quantities of air.

A still further object of the invention is to provide a blast gun for the use described which may be very readily disassembled to permit of replacement of parts which have become worn.

The invention possesses other objects and features of advantage, some of which, together with the foregoing, will be specifically set forth in the detailed description of the invention hereunto annexed. It is to be understood that the invention is not to be limited to the specific form thereof herein shown and described as various other embodiments thereof may be employed within the scope of the appended claim.

Referring to the drawing:

Figure 1 is a top plan view of the complete blast gun of my invention.

Figure 2 is a longitudinal vertical sectional view of the gun. The plane in which the view is taken is indicated by the line 2—2 of Figure 1.

Figure 3 is a transverse vertical sectional view of the gun. The plane in which the view is taken is indicated by the line 3—3 of Figure 2.

In detail, the blast gun comprises a preferably cylindrical metal barrel 4 having at one end a diametrically enlarged boss 6 and at the opposite end a bulbous head 7. The barrel 4 is provided with an axial bore 8 which passes through a relief chamber 9, formed intermediate the ends of the barrel 4, and through an air chamber 11 which is formed by hollowing out the head 7. The purpose of the relief chamber 9 is to reduce the amount of metal that the drill, used in forming the bore 8, must pass through so as to lessen machining time and costs. A pair of axially concentric counterbores 12 and 13, formed in the boss 6, are in communication with one end of the bore 8. In the bore 8 is a tubular discharge duct 14 one end of which extends outwardly from the housing slightly beyond the end of the head 7, and the other end of which is provided with a diametrically enlarged head 16 which is seated within the counterbore 13.

Means is provided for directing a blast of air under pressure into the discharge duct 14. Provided in the counterbore 12 are screw threads 17 which mesh with mating threads formed on a nipple 18, extending into the counterbore and comprising an extension of the shank 19 of a downwardly directed pistol-grip handle 21. A flange 22, formed as an integral part of the shank 19, engages the end of the boss 6 and acts as a stop in limiting the amount of engagement of the nipple 18 in the counterbore 12. The shank 19 is provided with a central passage 23 which, at one end, is internally threaded to receive the threaded shank of a jet nozzle 24 which has a conical end 26 spaced from a complemental conical seat 27 formed in the end of the discharge duct head 16. The spaced conical surfaces 26 and 27 provide an injector passage between the jet nozzle 24 and the discharge tube head 16. The jet nozzle 24 is provided with an orifice 28 which is axially concentric with the bore 29 of the discharge duct. The other end of the passage 23 is directed downwardly within the handle 21. The handle 21 is cored out so as to form a hollow chamber 31 separated from the passage 23 by a wall 32 and a hose coupling 33, threaded into the lower end of the handle 21 and adapted to be connected with a hose containing compressed air, is provided for admitting the compressed air into the handle chamber 31. Formed on the handle 21 is a boss 34 which has a bore 36 therein piercing the wall 32 so as to provide for intercommunication between the chamber 31 and the passage 23. The portion of the bore 36 in the boss 34 is threaded to receive the threaded body 37 of a control valve; the valve body being extended and formed with an end flange 38 positioned within and sealing the portion of the bore 36 which passes through the dividing wall 32. The valve body 37 is provided with an axial bore 39 and with apertures 41 through which the bore 39 and the passage 23 are in communication. A valve stem 42, smaller in diameter than the bore 39, is positioned axially in the latter and has, at the end thereof within the chamber 31, a disk valve 43 which covers and normally closes the end of the bore 39. The valve 43 may be mounted on the end of the stem 42 in any suitable manner such as by the retaining washer and nut 44 shown. A head or push button 46 se-

cured to the valve stem 42 has a hub 47 which enters and is slidably guided in a counterbore 48 formed in the valve body 37, a coil spring 49 being also contained in the counterbore 48 which engages the hub 47 and resiliently presses the valve disk 43 on its seat. It will be seen that when the push button 46 is pressed, the valve disk 43 will be moved to uncover the end of the bore 39 thereby allowing compressed air contained in the handle chamber 31 to flow through the bore 39 and apertures 41 into the passage 23 through which it will flow to be discharged through the jet orifice 28 into the discharge duct 14. The construction of the control valve permits it to be removed as an integral unit from the handle 21 so that it may be inspected or the parts thereof replaced or repaired. Likewise, unscrewing the shank 19 from the boss 6 bares the jet nozzle 24 so that this part may be examined or replaced.

Means is provided for admitting material into the discharge duct 14 to be admixed with the stream of compressed air flowing therethrough. Formed on and extending radially from the boss 6 is a hub 51 internally bored and provided with screw threads 52 which engage mating threads formed exteriorly of a suction duct 53 which enters and is secured in the bore of the hub 51. The upper end of the suction duct is provided with internal screw threads 54 which receive the correspondingly threaded stem 56 of a suction nozzle 57 which has a conical end surface 58 entering and seated in complementarily tapered and axially alined apertures 59 and 61 formed, respectively, in the hub 6 and in the head 16 of the discharge duct 14. The upper end of the suction nozzle 57 terminates substantially flush with the periphery of the bore 29 of the discharge duct 14 and is provided with an aperture 62 through which the discharge duct bore 29 and the bore of the suction duct 53 are in communication.

It will be seen that when a blast of compressed air is flowing from the jet nozzle orifice 28, and expanding in flowing through the discharge duct 14, a reduced pressure will be created in the suction duct 53 and also in the injector air passage. Thus, when the suction duct 53 is connected to a container, in which a quantity of readily flowable material is placed, the said material will be drawn, by the suction in the suction duct 53, through the latter and into the discharge duct 14 where it will be immediately caught by and dispersed in the air stream flowing through the discharge duct 14 and will thereafter be blown from the end of the duct 14. Apertures 60 entering the counterbore 12 permit atmospheric air to be drawn through the injector passage into the discharge duct 14.

Means is provided for mixing additional quantities of air with the admixture of air and entrained material flowing through the discharge duct 14 before the admixture is discharged into the atmosphere. Disposed concentrically with and extending beyond the open or discharge end of the discharge duct 14 is a tubular discharge nozzle 64 having screw threads 66 formed at one end thereof which engage in mating threads provided in a bore formed in the end of the bulbous head 7. The positioning of the discharge nozzle 64 forms an annular duct 67 surrounding the end of the discharge duct 14 and entering the air chamber 11 formed in the head 7. A plurality of circumferentially spaced openings 68 drilled through the side wall of the air chamber 7 permit communication of the latter with the atmosphere. It will be seen that when a blast of air and material entrained therein is flowing from the end of the discharge duct 14 it will create a suction in the annular duct 67 thus drawing atmospheric air, which has entered the chamber 11 through the openings 68, into the discharge nozzle 64 where it will become mixed with the blast and will augment the air contained in the mixture flowing from the discharge duct. This not only effects a more thorough dispersion of the air and material mixed therewith but also, when abrasive material such as sand is being carried by the air blast, forms an annular air cushion between the mixture, issuing from the discharge duct, and the inner periphery of the nozzle 64 so that wearing away of the latter, by the hard and sharp sand particles, is greatly retarded.

The blast gun above described is quite versatile in that, with very little alteration, it may be put to a wide variety of uses. For instance, since it will handle any flowable material besides sand, such as paint, insecticides, or inflammable oils or gases, it may, without alteration, be used, respectively, as a paint spray gun, a plant spray or sulfur duster, or as a blow torch or oil burner. In addition to these uses it may be utilized as a vacuum lift to remove liquids or other fluent matter from inaccessible pockets or sumps.

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

A device of the class described comprising a substantially cylindrical barrel having therein an axial bore and a concentric auxiliary fluid chamber, said barrel having adjacent an end of said axial bore a frusto-conical opening axially perpendicular to and intersecting the axis of said barrel bore; a tubular member removably positioned in said barrel bore and provided with a bore forming a fluid discharge duct, said tubular member having adjacent one end thereof, and in axial alinement with the frusto-conical opening of the barrel, a complementary frusto-conical opening, a handle member removably secured in said barrel and having therein a passage to be connected at one end with a source of fluid under pressure, a jet nozzle connected with said handle member and having therein an orifice in communication with said handle passage and through which said fluid under pressure may flow into an end of said fluid discharge duct, a valve in said handle for controlling the flow of said fluid under pressure through the handle passage and the said orifice thereof, a suction duct, through which fluent material may flow, connected with said barrel, a suction nozzle connected with said suction duct and having a conical end portion entering and seated in the axially alined frusto-conical openings of said barrel and said tubular member, said suction nozzle having therein an aperture opening into said discharge duct, in communication with said suction duct, and spaced longitudinally of said tubular member from the jet nozzle orifice, a tubular discharge nozzle mounted on an end of said barrel in concentric relation with said tubular member so as to provide therebetween an annular passage, and said annular passage being in communication with said auxiliary fluid chamber.

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