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POWDER FEED ARRANGEMENT FOR FLAME SPRAY GUN

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FIG. 2.

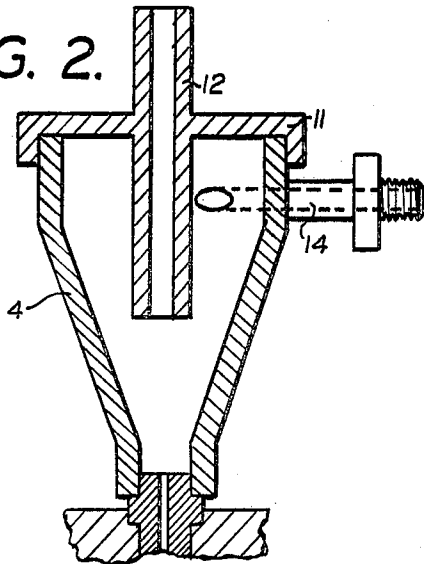


FIG. 3.

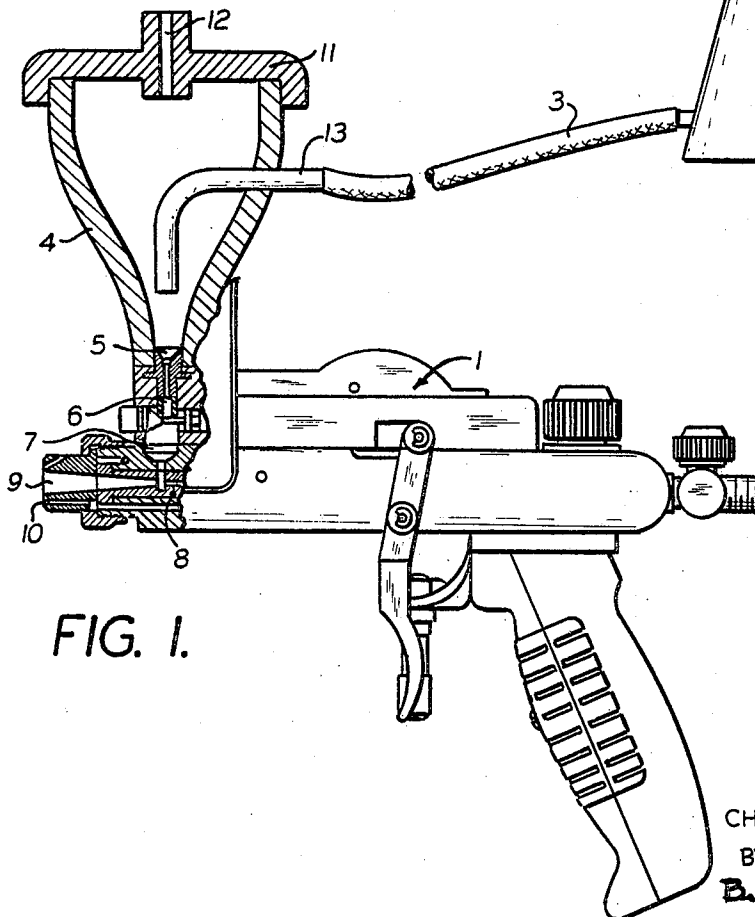
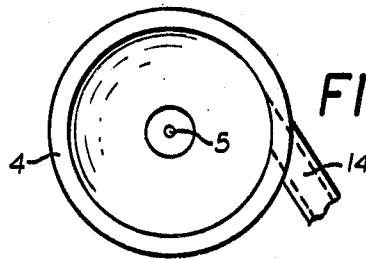


FIG. 1.

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POWDER FEED ARRANGEMENT FOR FLAME SPRAY GUN

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9 Claims

ABSTRACT OF THE DISCLOSURE

Flame spray gun with a remote powder reservoir and a conduit connecting the gun and the reservoir and means for conveying powder entrained in a carrier gas from the reservoir through the conduit to the gun having in combination therewith means at the gun end of the conduit for separating the powder from the carrier gas and feeding the separated powder directly into the gun this arrangement preferably being in the form of a chamber mounted on the gun with the conduit leading therinto and which is provided with a gravity powder outlet at its lower end leading into the gun and a gas exhaust from the chamber.

This invention relates to an improved powder feed arrangement for a flame spray gun. Powder type flame spray guns are well known and widely used and, for example, are described in U.S. Patents 2,820,670 of Jan. 21, 1958, and 2,961,335 of Nov. 22, 1960. The powder supply for powder type flame spray guns, as for example shown in the above mentioned United States patents, is often maintained in a reservoir or hopper directly connected to the gun. This, however, limits the supply of powder available and may interfere with the manipulation and handling of the gun.

It is also known to feed the powder to the gun from a remote reservoir through a conduit. The feeding of powder in this manner by gravity has in most instances proven unreliable and it has generally become the practice to feed the powder from the remote reservoir to the conduit entrained and carried by a carrier gas. The volume and velocity of carrier gas required for reliable transportation from the reservoir through the conduit to the gun is not, however, generally the optimum proportion of carrier gas for spraying. The conveying of the powder in this carrier gas into and through the gun therefore often causes problems in that the same may project the powder through the flame at too high a velocity for efficient heating and the carrier gas may undesirably cool the flame and/or cause a powder velocity through the flame at a rate other than that which favors optimum heating of the powder particles by the flame.

One object of this invention is to avoid the above mentioned disadvantage and to provide a reliable transportation of powder from a remote reservoir in a carrier gas to the flame spray gun while eliminating the actual spraying disadvantages caused by the presence of the conveying carrier gas. This and still further objects will become apparent from the following description read in conjunction with the drawings in which:

FIG. 1 is a side elevation partially in section showing a flame spray gun with a remote powder feeder provided with an embodiment of the invention;

FIG. 2 is a vertical section showing a further embodiment of the invention, and

FIG. 3 is a plan view of the device shown in FIG. 2.

The invention is applicable to any powder type flame spray gun having a remote powder reservoir, a conduit connecting the gun and reservoir, and means for convey-

ing powder entrained in a carrier gas from the reservoir through the conduit to the gun. In accordance with the invention means are provided at the gun end of the conduit for separating powder from carrier gas and feeding the separated powder directly into the gun. The means for separating the powder from the carrier gas preferably comprises a powder-gas separating chamber mounted on the gun. This chamber may have any known or conventional construction for separating entrained powder particles from the gas and is most simply in the form of a chamber into which the powder and gas mixture are injected, the powder being separated from the gas ballistically, by gravity, centrifugally, or the like, the separated carrier gas vented to the atmosphere and the powder gravity fed directly into the gun. While the chamber may accumulate the powder so separated, it has been found preferable if the same is constructed so that it feeds directly into the gun without accumulation. This can be most simply done by constructing the gravity feed outlet so that the same will allow powder to flow out there-through by gravity at a higher rate than the maximum inlet rate of the carrier gas entrained powder.

Referring to the embodiment shown in the drawing I represents a conventional powder type flame spray gun having the construction as shown in U.S. Patents 2,820,670 and 2,961,335. The gun is provided with a remote powder reservoir which feeds powder entrained in a carrier gas through the conduit 3. The remote powder reservoir and feeder may, for example, have the construction as described in U.S. Patent No. 3,138,298 of June 23, 1964. In accordance with the invention, connected on top of the gun is the separating chamber 4. This separating chamber has a circular cross section and has an enlarged upper portion which conically narrows at its lower portion terminating with the gravity flow passage 5. The gravity flow passage leads through the conventional rubber tube pinch type valve arrangement 6 into the feed passage 7 where powder flowing by gravity is picked up by a carrier gas flowing through the orifice 8 and is propelled to the nozzle 9 into the flame sheath emerging from the nozzle jet 10. The separating chamber 4 is provided with the cover 11 which has the carrier gas vent 12. The conduit 3 is connected to an inlet pipe 13 which leads centrally into the chamber and which is directed downwardly toward the gravity outlet passage 5. In operation powder entrained in a carrier gas is fed from the remote reservoir 2 in the conventional manner through the conduit 3. The carrier gas entrained powder enters the separating chamber 4 through the inlet pipe 13 where entrained powder is directed downwardly toward the flow passage 5 and ballistically separates from the carrier gas which flows upwardly and out through the vent 12. The separated powder flows down through the passage 5 through the valve 6 into the inlet 7 and out through the nozzle 9 without accumulating in the chamber 4. In all other respects operation of the gun is conventional and as is described in said U.S. patents.

The amount of and velocity of the carrier gas used to convey the powder to the reservoir 2 through the conduit 3 may be chosen for optimum and reliable conveyance without being limited by the spraying conditions and this carrier gas due to the separation from the powder in accordance with the invention in no way influences the spraying or operation of the gun.

The separation of the powder from the carrier gas may be effected in any known or desired manner. In this embodiment shown in FIGS. 2 and 3 the inlet pipe 14 extends tangentially into the chamber 4 so that the powder will be imparted a whirling motion and will centrifugally separate from the carrier gas with the chamber acting as a cyclone separator.

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As mentioned, any other known or conventional separators may be used, including, for example, screen type separators, or simple gravity separators in which the velocity of the gas is expanded by expansion, and/or baffles causing the powder to fall by gravity.

I claim:

1. In combination with a powder type flame spray gun having a remote powder reservoir, a conduit connecting the gun and reservoir, and means for conveying powder entrained in a carrier gas from the reservoir through the conduit to the gun; means at the gun end of the conduit for separating powder from carrier gas and feeding the separated powder directly into the gun.

2. Combination according to claim 1 in which said means for separating powder from carrier gas comprises a chamber mounted on the gun with said conduit leading thereinto, a powder outlet at the lower end of the chamber and a gas exhaust from the chamber.

3. Combination according to claim 2 in which said powder outlet is a gravity flow outlet at the bottom of said chamber and including a powder inlet to said chamber connected to said conduit and directed into an enlarged portion of said chamber toward said gravity flow outlet.

4. Combination according to claim 3 in which said flame spray gun has a gravity feed powder inlet leading into a gas flow passage and in which said gravity flow outlet forms a continuation of said gravity feed inlet.

5. Combination according to claim 2 in which said chamber narrows in a downward direction with said powder outlet at the lower end comprising a gravity flow outlet, and including a powder inlet connected to said conduit and tangentially leading into an enlarged upper portion of the chamber.

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6. Combination according to claim 5 in which said gas exhaust comprises a gas outlet opening from the upper portion of the chamber.

7. Combination according to claim 6 in which said flame spray gun has a gravity feed powder inlet leading into a gas flow passage and in which said gravity flow outlet forms a continuation of said gravity feed inlet.

8. In the method of conveying powder from a remote location to a flame spray gun in which the powder is conveyed through a conduit entrained in a carrier gas to the gun, the improvement which comprises separating the powder and carrier gas at the gun and directly feeding the separated powder into the gun.

9. Method according to claim 8 in which the separated powder is directly gravity flowed into the gun.

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U.S. Cl. X.R.

222—193; 302—59