Dec. 21, 1965 G. BUDDENHAGEN 3,224,748

REGULATING DEVICE FOR POWDER NOZZLES

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Fig. 1.

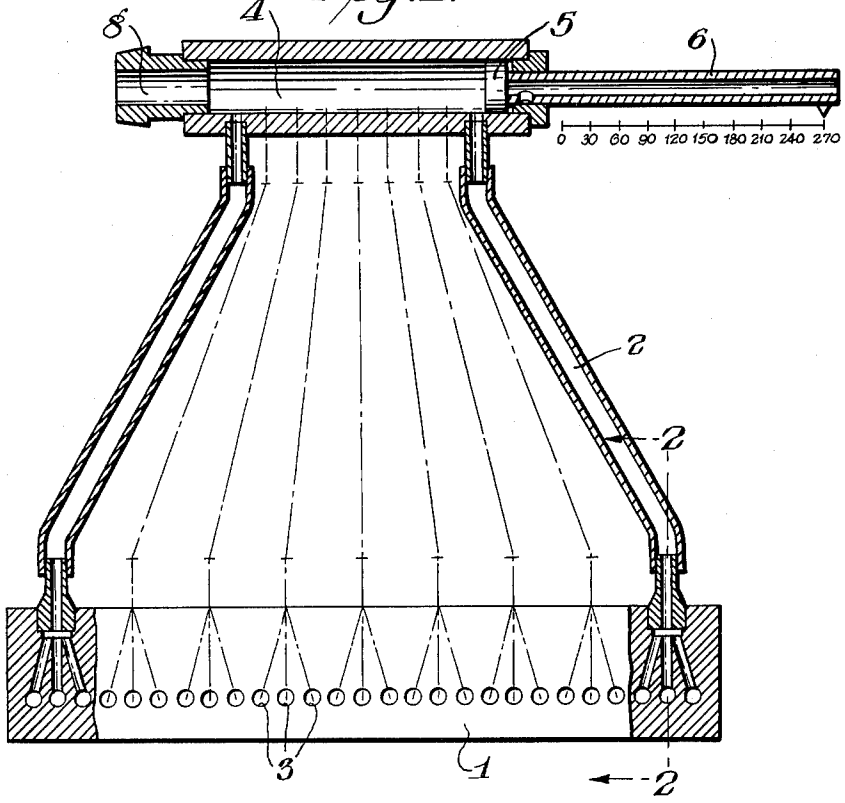
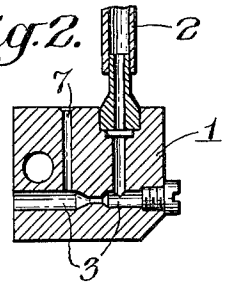


Fig. 2.



INVENTOR

Guenter Buddenhagen

BY Connolly and Hutz

ATTORNEYS

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REGULATING DEVICE FOR POWDER NOZZLES

Günter Büddenhagen, % Knapsack-Griesheim AG., Werk Griesheim-Autogen, Frankfurt am Main, Germany

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3 Claims. (Cl. 266—23)

This invention relates to an improved device for regulating powder nozzles used for introducing a powdered auxiliary agent such as iron powder into the stream of cutting oxygen employed in the flame scarfing of ingots and like metal workpieces. More particularly, it concerns such a device whereby the width of the powder stream projected from the nozzle exit is conveniently regulated in accordance with the size of the workpiece to be scarfed.

An improved powder nozzle for use in flame scarfing is disclosed in the copending application Serial No. 130,-131 filed August 8, 1961, by Günter Büddenhagen from which the powder is blown by means of a conveyor gas, preferably compressed air. Means are disposed within the powder nozzle for distributing the powder uniformly over the width of the powder nozzle exit. A feature of the device there disclosed is that the powder is supplied to a location close to the nozzle exit solely by means of gravity before mingling with the stream of conveyor gas.

It is further disclosed in the copending application to provide the powder nozzle with a regulating device for controlling the width of the powder stream projected from the nozzle. Such regulation is achieved by correspondingly changing the width of the stream of conveyor gas flowing through the nozzle, preferably by means of a sliding valve disposed in the channel through which the conveyor gas is supplied to the nozzle exit. It is obviously desirable for reasons of economy to project a stream of powder no wider than the workpiece to be scarfed.

When employing a single powder nozzle in the scarfing machine with which however only limited widths of workpiece can be scarfed, it is disadvantageous that the regulating device of the copending application is difficultly accessible and that the steering rod of the sliding valve projects from the side of the device for a considerable distance when the valve is wide open. These disadvantages are particularly noticeable when the scarfing machine is to be employed for workpieces of substantial width, for example for a scarfing width of 0.25 to 2 meters, in which case it is necessary to provide a plurality of powder nozzles side by side. If in such case the width of the powder stream is to be regulated as disclosed in the copending application by means of a single sliding valve arranged within the powder nozzles, this means that the gas channels across which the valve slides must be lined up precisely and that no air spaces or gaps are permitted between the individual powder nozzles. Furthermore, the steering rod of the sliding valve in such case must have a length which corresponds at least to the maximum scarfing width and will extend in the case of a scarfing width of about 2 meters out of side of the powder nozzle for some 2 meters when the valve is wide open. It is also not possible to provide a remote control when thus arranging the regulating device within the gas channel of the powder nozzle.

In accordance with the present invention, it is therefore provided that the regulating device and the supply channel for the conveyor gas are arranged outside of the powder nozzle and that the supply channel is connected to a plurality of channels in the nozzle by means of hoses, tubes, or the like. This has the advantage that

the regulating device and supply channel can be arranged independently of the powder nozzle at a suitable location where the steering rod of the sliding valve, which projects sideways, does not interfere. Furthermore, such location may be readily accessible, and the heat which surrounds the powder nozzle need have no detrimental effect. When arranging a plurality of powder nozzles side by side, this has the further advantage that each powder nozzle may be provided with a separate regulating device and that the precise arrangement of the channels, the sealing of the nozzles with respect to each other, and the very long steering rod of the sliding valve can be avoided. The regulating devices in such cases may be arranged at a single or several desired locations either side by side, above and below, or before and behind each other.

As the regulating element there is preferably provided in the gas supply channel a movable sliding valve, preferably a cylindrical piston. It is however also possible to employ closing valves in the hoses, tubes, or the like, whereby the steering rod which projects sideways can be avoided, or other suitable regulating devices for the flow of a conveyor gas.

In a further embodiment of the invention the length of the gas supply channel is made less than one-half the width of the powder nozzle. Generally for this purpose several channels are provided in the nozzle for each connecting hose. In this fashion the regulating device can be made substantially smaller, and the steering rod of the piston valve, when wide open, will not project so far from the side of the scarfing machine. This is also the case if a single sliding valve is employed for a plurality of powder nozzles. For the purpose of bringing together the entire regulating device at a location removed from the scarfing machine, for example at a control panel for the same, the smallness of the regulating device is of advantage, quite aside from the lessening of the amount of materials required.

In the apparatus according to the invention it is also possible by valve means connected in parallel to adjust the streams of scarfing oxygen and/or heating gas for the scarfing heads to any desired width.

The invention will be described in connection with a single embodiment shown in the accompanying drawing in which:

FIG. 1 is a sectional elevational view of a powder nozzle and its associated regulating device; and

FIG. 2 is a sectional view along the line II—II in FIG. 1.

The powder nozzle **1** is provided with a plurality of channels **3** out of which the powder is blown by a conveyor gas which in this case is compressed air introduced through a pipe **8** into the channel **4** and from there through a plurality of flexible hoses **2** to the nozzle channels **3**. In order to shorten the supply channel **4**, three nozzle channels **3** are connected to each hose **2**. The powder is conveyed into the nozzle channel **3** through a bore **7**, as may be seen in FIG. 2.

The regulation of the width of the powder stream projected out of nozzle channels **3** is accomplished by closing one or more of the hoses **2** from the supply channel **4**, i.e. by sliding the piston valve **5**. Since there is no compressed air available in the closed-off nozzle channels **3**, no powder can blow out of them.

The steering rod **6** of the piston valve **5**, due to the shortening of the supply channel **4**, hardly projects beyond the powder nozzle **1** and is provided with a scale on which the width of the powder stream may be read.

While the invention has been described in connection with a specific embodiment, other modifications thereof will be apparent to those skilled in this art without de-

parting from the spirit and scope of the invention which is defined in the appended claims.

What is claimed is:

1. An apparatus for flame scarfing metallic workpieces comprising in combination a powder nozzle having a plurality of sets of outlet channels spaced over a pre-determined width dimension, each set including at least two outlet channels and a common inlet channel, powder feed means connected to each outlet channel in said sets for feeding powder thereto, pressure means connected to each of said inlet channels to accelerate the flow of powder through said outlet channels, said pressure means including pressure medium supply connecting means, a manifold communicating with said pressure medium supply connecting means, said manifold being spaced from said nozzle and having a width substantially smaller than said predetermined nozzle width dimension, a plurality of conduits connected to said manifold, each of said conduits communicating with a respective inlet channel of said sets of said outlet channels, and sliding valve means in said manifold for closing a selected number of said conduits and their respective sets of outlet channels in accordance with the extent to which said valve means is inserted into and extended out of said manifold.

2. An apparatus as set forth in claim 1 wherein said valve means is a piston valve having an elongated rod connected thereto extending from one end of said manifold, the other end of said manifold communicating with said pressure medium supply means and the overall width of said manifold and said piston rod in its fully extended position being no greater than said pre-determined nozzle width.

3. An apparatus as set forth in claim 1 wherein each of said sets of outlet channels includes three outlet channels.

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WHITMORE A. WILTZ, *Primary Examiner.*

MORRIS WOLK, *Examiner.*