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METERING DEVICE FOR PRESSURE FEED CONTAINERS, ESPECIALLY FOR METALLURGICAL PURPOSES

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Fig. 1

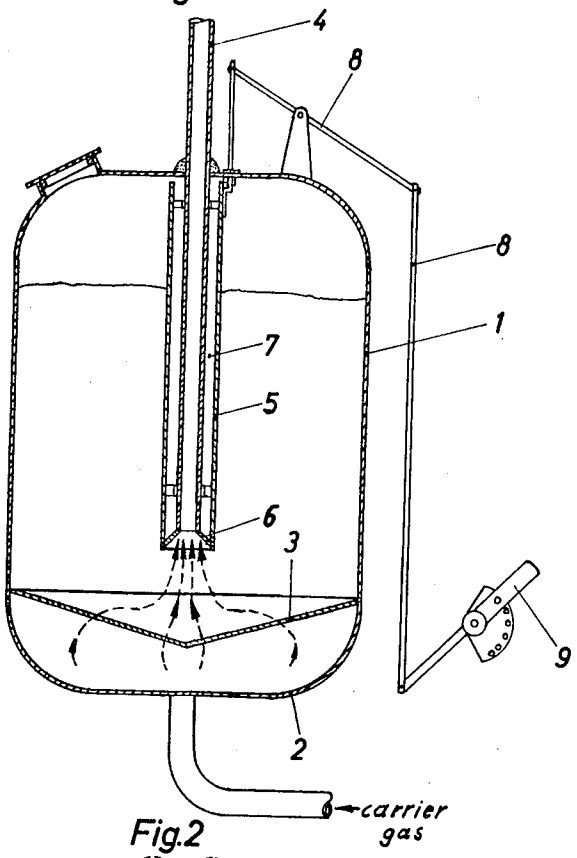
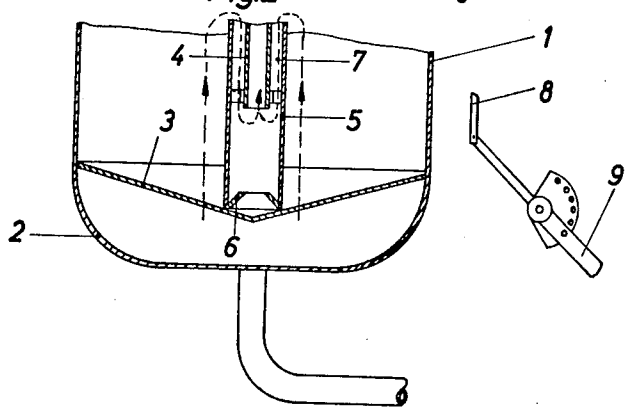


Fig. 2



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METERING DEVICE FOR PRESSURE FEED CONTAINERS, ESPECIALLY FOR METALLURGICAL PURPOSES

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The present invention relates to pressure feed containers, especially for metallurgical purposes, by means of which pulverous or fine granular material and a carrier gas may, in relatively variable ratios of quantity be introduced, for instance into metallic melts.

In the mining industry, frequently the requirement exists to effect the composition of metallic melts in one or the other direction. In most instances, it is calcite which, in smaller or larger quantities, has to be added to the melts for obtaining metallurgical reactions in order to be able to eliminate, in the form of slag, those elements which are harmful to steel. Inasmuch as mining laboratories desire to be able quickly to change metallurgical melts in the desired manner, the mining industry employs pulverous or fine-grained materials which are introduced into the melts. Recently, pneumatic conveyor installations have been employed in the mining industry for this purpose. Thus, for instance, at the end of a conveying line connected to a pneumatic conveyor installation, a material feeding pipe has been employed which is generally termed "twyer" and which is made of graphite so as to be able to resist the influence of the melts and the high temperatures involved. The twyer has the shape of a tube and is inserted deeply or slightly into the metallic melt, depending on the requirements, or may have its mouth slightly above the surface of the melt.

Pressure conveying installations are able to convey granular or fine-grained material only when such material is fluidized together with a gaseous carrier medium. Such carrier medium may, for instance, be oxygen used for refining metal, or may consist of another inert gas. For a refining process, depending on the magnitude of the charge, a certain quantity of admixture or extra, is required. It is desirable that this admixture or extra be inserted into the melt simultaneously with the carrier gas and uniformly distributed over the entire duration of the introduction of the gas. To this end, however, it is necessary that the relationship of carrier gas to extra may be varied, depending on the metallurgical requirements.

It is an object of the present invention to provide a metering device for use in connection with pressure feeding containers, which will simplify the introduction of additions into a melt.

It is another object of this invention to provide a metering device as set forth in the preceding paragraph, which will make it possible to vary at random the ratio of the quantity of the material to be conveyed with regard to the carrier gas within a certain limit from zero to a maximum, depending on the respective installation.

These and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawings, in which:

FIGURE 1 diagrammatically illustrates a section through a cylindrical pressure container according to the present invention;

FIGURE 2 shows the container of FIGURE 1 in a different position of operation.

The arrangement according to the invention is characterized primarily in that coaxially around the material conveying pipe in the pressure conveying container there

is provided a control pipe adjustable from the outside as to height and communicating with the upper chamber of the pressure feeding container. This control pipe is adapted to be lowered from the level of the mouth of the material conveying pipe to the bottom of the pressure container where the material is opened up or loosened.

The supply of gas for the metallic process, however, remains constant to the originally provided extent. To this end, the control pipe has its upper air cushion portion in the pressure feeding container provided with an opening. In addition thereto, the lower free end of the control pipe may be provided with an inwardly directed ring the inner diameter of which is less than the outer diameter of the material and gas discharge pipe, so that the ring when in the highest position of the control pipe, can closely engage the discharge pipe. This makes possible the conveying at the highest material-gas ratio because, when the radially directed ring mounted on the control pipe engages the mouth of the feeding pipe, the connecting opening of the control pipe to the container compressed air cushion chamber, will be ineffective.

It is known to influence the conveying of pulverous material, in conformity with the conditions determined by feeding height and feeding length and composition of the material, in such a way that the conveyed quantity of material may additionally be thinned by an excess of carrier gas. It is furthermore known, for purposes of controlling the quantity being conveyed, to vary the inlet cross-section into the conveyor pipe by means of a cone which is adjustable as to height and extends into the mouth of the conveyor pipe. With arrangements of this type, however, a change in the speed will take place in the cross-section of the opening at the conveyor mouth. This change in speed will, at a decrease in the conveyor cross-section, result in an increase in the conveying speed which, in turn, for instance in connection with processes employing pure oxygen, will endanger the mouth of the conveying means and thereby the entire installation. The above-mentioned drawbacks have been entirely avoided in a rather simple manner and at a minimum of cost.

More specifically, with reference to the drawing, the drawing shows a cylindrical pressure container **1** the bottom **2** of which has connected thereto a gas supply line and a porous gas permeable intermediate bottom **3** which may, for instance, be of conical shape. For purposes of conveying material, there is provided a discharge pipe **4** which may be arranged around the central axis of container **1**. Coaxially with said pipe **4** there is provided a control pipe **5** the lower end of which is equipped with an inwardly directed ring **6**. This control pipe **5** may be adjusted from the outside of the pressure container through the intervention of a linkage **8** and an adjusting member **9** which, for instance, may be adjusted manually in upward or downward direction. The adjustability is limited by the fact that on one hand, the control pipe will, after certain downward adjustments engage the intermediate bottom **3** of the pressure container **1**, while on the other hand, the control pipe **5** when occupying its highest position, will have ring **6** engaging the lower free end of the pipe **4**. In the first-mentioned instance, which is shown in FIG. 2, no more material can be conveyed, and the admission of gas is fully opened. In the last-mentioned instance, when the control pipe **5** is in its highest position, dust-shaped or granular material can be freely conveyed onto bottom **3**, and the supply of the oxygen which normally flows between pipe **4** and control pipe **5**, will be shut off. Depending on the height of the control pipe **5**, it will thus be possible, with the same quantity of gas, to introduce more or less additional or extra material into the melt.

This arrangement has, among other advantages, the

advantage that the charge through the twyer provided at the end of the conveyor line which is connected to pipe 4, may be controlled from a single point of the pressure conveying container.

It is, of course, to be understood that the present invention is, by no means, limited to the particular construction shown in the drawing, but also comprises any modifications within the scope of the appended claims.

What I claim is:

1. In combination: A gas tight container adapted to receive pulverous material, a gas permeable member in the container spaced upwardly from the container bottom and dividing the container into an upper chamber in which the pulverous material is received to rest on said member and a lower chamber to which gas under pressure is supplied to flow upwardly through said member and maintain said pulverous material in a free flowing state, a discharge pipe in the container having its lower end axially spaced from said member and leading vertically upwardly in said container and passing to the outside of said container and adapted for the discharge of gas and pulverous material from said container, a control pipe vertically moveable in the container and surrounding said discharge pipe in radially spaced relation to establish an annular pasage between said pipes leading between the upper end of said control pipe and the lower end of said discharge pipe, said control pipe extending to near the top of the container and having its upper end open and continuously exposed to the inside of the container to receive gas from the container from the space therein above the upper level of the pulverous material in the container, means carried by said control pipe adapted when the control pipe is moved to a first uppermost position only in the container to close off said passage while

leaving the lower end of said discharge pipe open, said control pipe operatively sealingly engaging said member when said control pipe is moved to a second lowermost position only and thereby closing off the supply of pulverous material from the container to the lower end of said discharge pipe while maintaining said passage to the lower end of said discharge pipe, and control means connected to said control pipe for moving said control pipe between its said first and second positions and into any of a plurality of positions intermediate said first and second positions, said control means including actuating means disposed outside the container.

2. The combination according to claim 1 in which said means carried by said control pipe is an annular element on the lower end of the control pipe coaxial with said discharge pipe and adapted abuttingly to engage the lower end of the discharge pipe when said control pipe is in its said first position.

3. The combination according to claim 2 in which said annular element is inclined upwardly from the periphery thereof toward the center.

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