UNITED STATES PATENT OFFICE

2,505,049

ELECTRIC POWDER CONTROL

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Application March 31, 1945, Serial No. 585,690

11 Claims. (Cl. 302—17)

1. This invention relates to the art of feeding powder, and more particularly to electrical means for controlling the flow of powder.

In feeding powder, especially ferrous powder, which is carried and propelled by a fluid, such as air flowing under substantially constant pressure through a conduit, the scoring and rapid erosion of mechanical valves present a serious problem. Such valves must be properly designed to prevent clogging, and they need to be replaced frequently. This is not only expensive, but requires entire systems to be shut down while the valves are being repaired or replaced.

The main objects of the invention are to provide an improved method and means for feeding powder, particularly powder containing or composed of particles responsive to an electric field; and to provide novel feed means for measuring powder in a feeding system.

According to the invention the feeding of ferrous powder, for example, is controlled by a magnetic field crossing the path of such powder. In amplifying the invention, a novel magnetic powder feed system is provided which includes a non-magnetic tube for conducting powder therethrough and an electromagnet for polarizing powder in such tube to control the powder fed through the tube. The powder may be paramagnetic or diamagnetic as well as ferromagnetic, such as powdered iron, nickel, or magnetic alloy.

In any case the novel control is quite simple and avoids disadvantages and difficulties of the prior art.

In the drawings:

Fig. 1 is a diagrammatic view, partly in perspective, of a magnetic powder feed system exemplifying the invention; a novel magnetic powder feed system is provided which includes a non-magnetic tube for conducting powder therethrough and an electromagnet for polarizing powder in such tube to control the powder fed through the tube. The powder may be paramagnetic or diamagnetic as well as ferromagnetic, such as powdered iron, nickel, or magnetic alloy. In any case the novel control is quite simple and avoids disadvantages and difficulties of the prior art.

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such stream to control the quantity of powder flowing in such stream through such conduit. The latter may be adjusted to regulate the rate of flow of powder through the tube when the switch S is closed. Normally, however, when the switch S is closed, the powder flow ceases; and, when the switch is opened, the powder flow starts and continues until the switch is again closed.

The coil 22 of Fig. 3 is wound between disks 27 on a cylinder 28 of insulating material which fits an iron core 30 having angular projections 32. The projections 32 fit and extend through holes 34 in the iron yokes 36 to the top of which the iron pole pieces 18 are secured by screws 38. The pole pieces are directed so as to cause the magnetic powder and fluid to flow in said tube 8, which is the conduit of sufficient strength to control the amount of powder flowing therethrough.

Means for controlling the flow of magnetic powder in a conduit containing a fluid under pressure normally urging such powder to flow through the conduit, comprising an electro-magnetic valve as defined by claim 4 which also includes a housing of non-magnetic material within which the electro-magnet is supported so as to be spaced from the conduit, and the electro-magnet and the housing, and means including projections of said core for supporting the electro-magnet within the housing.

In combination a powder tube of electrically non-conducting material and magnetic means for polarizing powder in said tube by magnetic fields traversing the tube at longitudinally spaced areas for stopping and starting the flow of magnetic powder in said tube.

7. Powder feeding apparatus comprising, in combination, powder supply means constructed and arranged to entrain and suspend material containing magnetizable particles in a flowing stream of fluid, a conduit for said particle-laden fluid stream, said conduit communicating with said means for conveying the powder to said conduit; and means for regulating the flow of powder leaving the conduit.

8. A method of feeding powdered magnetizable material which comprises entraining and suspending magnetizable powder particles in a confined flowing stream of fluid, and controlling the rate of flow of said particles by subjecting such particle-laden stream to the force of a magnetic field of sufficient strength to retard the flow of powder and fluid.

9. The method of controlling the flow of powder described responsive to a magnetic field, which comprises conducting such powder through a conduit of non-magnetic material, and establishing a magnetic field across said conduit of sufficient strength to retard the rate of flow of such powder.

10. The method of controlling the flow of powder fed from a source of supply to point of consumption of powder by causing the powder to flow through a non-magnetic conduit by a stream of gas of sufficient velocity and under sufficient pressure to convey the powder through such conduit, and traversing such conduit with a magnetic field.
of sufficient intensity to control the quantity of iron powder forced through the conduit by such gas stream.

11. The method of valving iron powder laden gas, which comprises conducting the powder laden gas through a conduit and retarding the flow of iron powder in such conduit with a magnetic field which can be turned on and off to effectively open or close the conduit as desired.

ARTHUR M. KELLER.

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The following references are of record in the file of this patent:

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