Aug. 29, 1939. E. HASTERT 2,171,398

APPARATUS FOR HOMOGENIZING POWDERED MIXTURES

Filed June 12, 1935

fig. 1

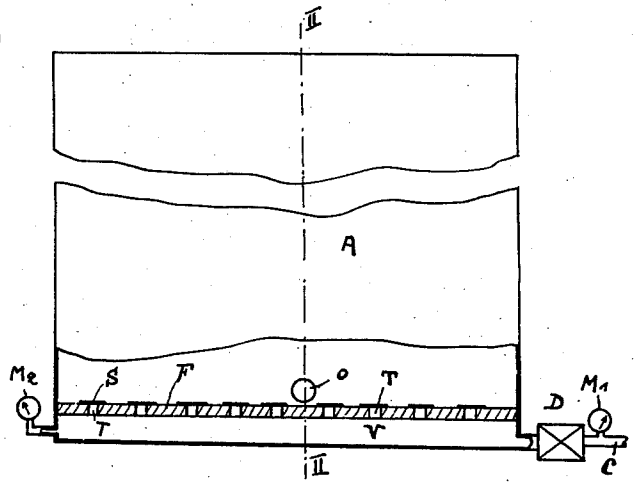
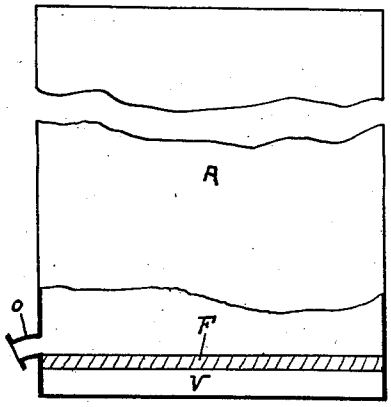


fig. 2



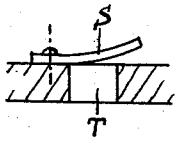
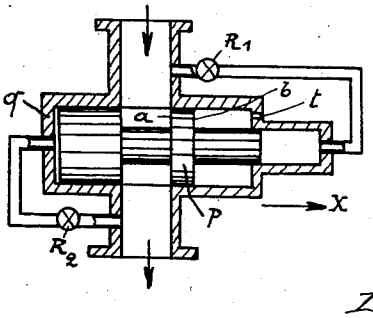


fig. 3

fig. 4



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APPARATUS FOR HOMOGENIZING POWDERED MIXTURES

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In Belgium June 16, 1934

1 Claim. (Cl. 259—99)

Using air under pressure is known for lessening the compacity of a powdered or pulverulent mass, increasing thus the mobility of the solid particles so as to impart to the mass a fluidity like that of a liquid.

The present invention provides for such an inclusion of air in the mass and concerns essentially the production of pressure waves in the complex medium composed by the gaseous agent and the solid particles so as to homogenize powdered mixtures submitted to such an operation.

The speed of propagation of waves in an elastic medium depends as is well known of the nature of this medium. In a complex medium the propagation of waves is not uniform by reason of local variations of the nature of the material, and of refractions and reflexions of the waves at the surfaces of separation of parts of different natures. This nonuniform propagation products in the mass a turbulency which renders it after a certain time perfectly homogeneous.

The invention provides that the waves may be produced in the said medium from one, two or more emission centers. Said waves may be obtained by using for maintaining the fluidity of the mass, air in pulsatory state, analogous to the pulsatory motion of sonorous phenomena.

When the waves are obtained by intermittently wholly cutting the air current at its penetration in the mass, the duration of these interruptions ought to be short enough to avoid falling of the mass again, even partially, in the compacity it had before the inclusion of air under pressure.

Practically the frequency of the pulsations may be such that the waves produced in the considered medium, impart in it a vibratory state by which homogenization is produced in a manner similar to the diffusion of two gases one into the other.

In the accompanying drawing, which shows in a non-limiting manner and by way of example some forms of execution of the invention,

Figure 1 is a vertical section through a homogenizing apparatus,

Figure 2 is a section on the line II—II of Figure 1,

Figure 3 is a detail view concerning the supply of air, and

Figure 4 is a sectional view of a pulsatory device.

In Figures 1 and 2 the receptacle of treatment or mixing container A, of any form and dimensions, is provided at its bottom with a perforated plate closing an air box V. The perforations T serve for the admission of air in the pulverulent mass contained in the receptacle A. The perforations may be closed by flexible covers S fixed only at a part of their periphery as shown in Figure 3 and which are raised by the pressure of air to open the perforations. These covers may be replaced by any means suitable for preventing passage of powdered material into the air box.

Between the air box and the supplying air pipe C, the air under pressure is put in an oscillatory state by any appropriate means, for instance by intermittently cutting its flow, by a device D mechanically controlled or automatic. Figure 4 shows an automatic apparatus in which the frequency of the pulsations is controllable by the cocks R_1 and R_2.

In the position shown in Figure 4 the pressure of the air current on the face *a* of the piston *p* the face *b* of which is subjected to atmospheric pressure through the passage *t*, produces a displacement of this piston *p* and of the piston *q* connected to it, in the direction of the arrow X. The piston *q* then partially stops the current of air and the pressure transmitted through the cock R_1 increases, the pressure transmitted through the cock R_2 simultaneously decreasing. Both pistons then move in the direction opposite to the arrow X thus returning to the position shown in Figure 4, from which they are again shifted as described above. These alternative displacements create in the air current the desired waves or pulsations.

It is to be noted that according to the invention the pulsations may also be produced by vibratory plates such as those used in wind music instruments.

These plates may consist of vibratory plates arranged in place of the flexible covers S shown in Fig. 3, or of any of them.

When the powdered mass has been introduced in the mixing receptacle, air is supplied in the air box, and the device D is alternately put in motion.

The production of the waves may be observed by two manometers M_1 and M_2 one positioned before and the other after the device D. The indicating needle of manometer M_2 takes an alternative movement between two extreme positions one on one side, the other on the other side of the pressure indicated by manometer M_1. The duration of treatment, variable according to the nature and the quantity of the mass to be homogenized, being first experimentally determined, the passage O is opened as soon as the desired grade of homogenization is obtained, thus allowing the mass to flow out of the receptacle, its fluidity being maintained by continuing the air

introduction until the receptacle is totally empty.

What I claim is:

An apparatus for homogenizing pulverulent mixtures by incorporating a fluid under pressure in the material to be homogenized, subjecting the heterogeneous medium of material to be homogenized and fluid under pressure to pulsations of pressure, comprising a receptacle for the material to be homogenized, means for supplying air under pressure, and means for communicating a vibratory state to the air under pressure.

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