Feb. 9, 1954 G. E. GARD 2,668,693

CONTINUOUS MIXER

Filed Nov. 14, 1951

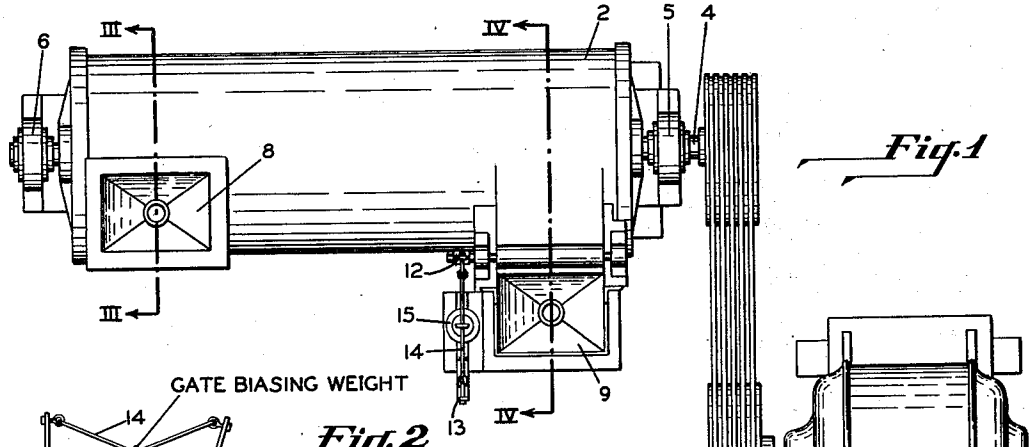


Fig. 1

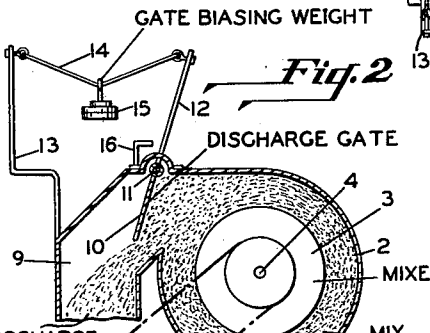


Fig. 2

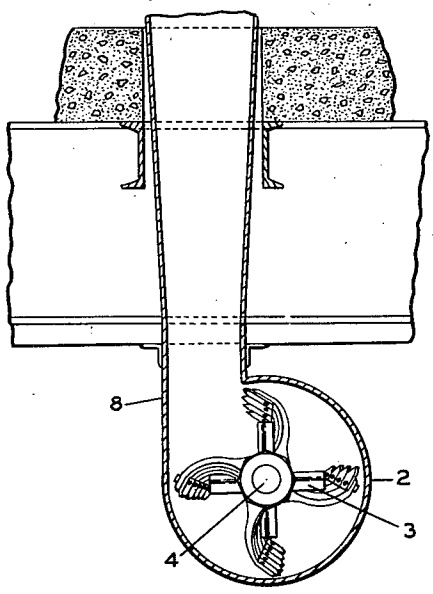


Fig. 3

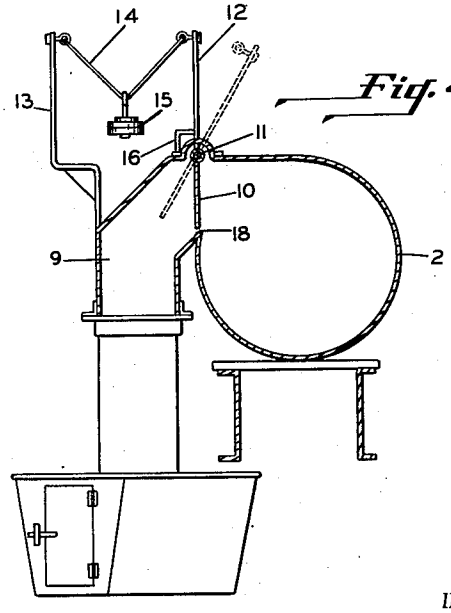


Fig. 4

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Patented Feb. 9, 1954 2,668,693

UNITED STATES PATENT OFFICE

2,668,693

CONTINUOUS MIXER

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Application November 14, 1951, Serial No. 256,219

2 Claims. (Cl. 259—9)

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This invention relates to continuous mixers and is concerned with the problem of delivering a predetermined energy input to the material in the mixer body.

In copending application Serial No. 196,137, filed by me and Washington H. Phillips November 17, 1950, now Patent No. 2,596,672 granted May 13, 1952, and entitled "Mixers," there is disclosed and claimed a mixer including an impedance element in the discharge orifice of the mixer for limiting the flow of material through the mixer and means responsive to increase or decrease in energy absorption by the material in the mixer body to control the impedance element. In the specific embodiment disclosed in that application there is provided a reversible motor for controlling a gate disposed in the discharge orifice of the mixer, the reversible motor in turn being controlled by a contact-making ammeter which responds to increase or decrease in the current input to the motor which drives the mixer agitator.

The present invention is directed to a modification of the mixer generically claimed in the above application. In the present embodiment the impedance in the discharge orifice is biased toward a closed position where maximum impedance to discharge of the mixer occurs and is movable to an open position where minimum impedance occurs, in accordance with the energy absorption by the material in the mixer. Preferably the impedance is in the form of a gate, and the gate is controlled by a counterweighting arrangement which biases the gate toward its closed position.

The principal object of my invention is to provide a continuous mixer with a controllable impedance of simple construction which may be readily adjusted for varying conditions of use.

An additional object of the invention is to provide a continuous mixer which may be readily adjusted to provide for controlled energy absorption by the material being mixed to obtain a substantially uniform distribution of a binder or other liquid component over particles or granules of cork or other solid component, while obtaining a sufficient shearing action of the components of the mix to obtain the desired distribution of the liquid component over the solid component.

Additional objects of the invention will be obvious from consideration of the following description of a typical embodiment of the invention which is shown in the attached drawing, in which:

Figure 1 is a top plan view of a continuous mixer embodying the present invention;

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Figure 2 is a diagrammatic sectional view illustrating the manner in which the impedance in the discharge orifice of the mixer may be adjusted for proper control in accordance with the energy absorption of the material being mixed;

Figure 3 is a sectional view of the inlet end of the mixer taken along the line III—III of Figure 1; and

Figure 4 is a sectional view, with the mixer agitator removed, of the discharge end of the mixer taken along the line IV—IV of Figure 1.

The mixer shown in Figure 1 includes a cylindrical shell 2 within which there is disposed an agitator or mixer blade structure 3 mounted on a shaft 4 which is journaled in bearings 5 and 6. Many different types of mixing blades may be used, depending upon the type of materials being mixed. With cork granules to be coated with a glue-glycerine binder, the type shown in Figure 2 which is known as a Sprout-Waldron 10-Ton Super Duty Deluxe Cold Mix High-Speed Agitator and is manufactured by Sprout-Waldron & Company of Muncy, Pennsylvania, will perform admirably. The shaft 4 which carries the agitator blades is rotated preferably at about 1200 R. P. M. by a motor 7. With a mixer having a drum about 60 inches long and about 18 inches in diameter, with the blades rotating at 1200 R. P. M. and a mass of cork and binder being fed thereto at the rate of about 30 pounds per minute, a 20 horsepower motor will be acceptable for driving the mixer. The mixer is disposed in a substantially horizontal plane and may be fed through an inlet opening 8 disposed adjacent to one end of the body mixer, as indicated in section in Figure 3. The mixed material is delivered through a discharge orifice 9 positioned adjacent to the opposite end of the body of the mixer as shown in section in Figure 4.

With mixers of this type there is a substantial movement of air from the inlet end toward the discharge end, particularly when the mixer body is not completely loaded. In mixing light density materials such as cork particles with a relatively small quantity of binder, there is a tendency for the particles which enter the inlet end of the mixer to be discharged from the opposite end prior to complete mixing which is necessary in order to effect transfer of the binder from one granule to another to obtain substantially uniform coating of the various granules with the binder. In addition to that, it is desirable with some mixes to effect a mechanical working of the particles, adequate to generate some heat therein, enough at least to maintain a substantially con-

stant elevated temperature in the mass as delivered from the mixer.

In order to accomplish this result, there is provided in the discharge orifice 9 of the mixer an impedance in the form of a gate 10 which is pivoted at 11 for movement to increase or decrease the size of the discharge orifice. In Figure 4 the gate 10 is shown in solid lines in its closed position and in dotted lines in its open position.

In order to control the movement of the gate 10 and restrict the movement of the mix through the mixer and thus obtain the desired mechanical working of the particles disposed within the mixer and traveling therethrough in the manner described in the copending application referred to, there is provided an arrangement for adjustably biasing the gate toward its closed position. Under no-load conditions the 20 horsepower motor may draw a current of about 10 to 15 amperes and under full-load conditions may draw up to approximately 25 amperes. Intermediate these two the current will vary, depending upon the energy required to mechanically work the particles; and thus the control of the gate may be effected by the application of sufficient biasing force to permit opening of the gate in accordance with a predetermined energy absorption by the mix, measured by the load on the agitator motor.

In Figure 2 there is shown a biasing arrangement which includes an arm 12 connected to the gate 10 and extending above the body 2 of the mixer. A bracket 13 is fixed to the machine as indicated in Figures 1 and 4, and a cable 14 or other tie is connected to the fixed bracket 13 and to the movable arm 12 which is connected to and extends above the pivoted gate 10. A variable gate-biasing weight 15 is hung on the tie 14. A stop 16 is provided for limiting closing movement of the gate 10. With this arrangement of a tie 14 which is connected to the fixed bracket 13 and to the gate 10 through the arm 12 and which is biased by weight 15 hung on the tie, the bias on the gate increases as the gate is opened.

As diagrammatically illustrated in Figure 2, a power indicator may be positioned in the power source to the motor 7. This may be in the form of an indicating ammeter 17. This ammeter is positioned in a location where the machine operator may observe it, and the biasing of the gate may be controlled by the application or removal of weights 15, sufficient to maintain the desired energy absorption by the mass. With a particular mix such as the cork granules with the glue-glycerine binder referred to above, the operator will apply weights 15 to the tie 14, and weights will be added or removed to maintain the desired loading on the mixer motor 7, observable on the ammeter 17, intermediate the 10 to 15 ampere reading under no-load conditions and the 25 ampere reading at full-load conditions. For example, if adequate mixing and the desired temperature elevation of the mass are determined to be obtained with a load on the motor 7, indicated by a reading of 23 amperes on ammeter 17, weights 15 will be applied to tie 14 with the mixer in operation until a value of 23 is obtained on the ammeter. Of course, when the mixer is first started up, the gate 10 will be biased to its closed position and will maintain that position until the mixer has been loaded and

the energy absorption by the mix and the thrust of the mass against the gate is adequate to move the gate away from stop 16. The counterweights 15 will continuously bias the gate 10 toward a closed position to maintain the predetermined energy absorption by the mix. If the desired energy absorption is not initially attained, more weight will be added; or, if excessive absorption of energy is observed by the ammeter reading, weight will be removed. A very close adjustment can be made by the use of small weights for the final increments.

It will be observed by reference to Figure 4 that with the gate 10 in closed position there still remains a small opening 18 through which mix may be discharged from the mixer. This opening is necessary in order that the mixer may be voided upon completion of a run; for, otherwise, since the gate closes upon reduction in load on the motor 7, it would not be possible to feed the remaining material from the mixer.

While a specific counterbalancing system has been shown for biasing the gate 10, other biasing arrangements may be substituted.

I claim:

1. In a continuous mixer, the combination of a mixer body, an agitator disposed within the body, said body having an inlet orifice for the delivery of material to the body for mixing by said agitator and a discharge orifice for the delivery of mixed material from the body, and means to control the delivery of mixed material from the body through said discharge orifice comprising a gate in the discharge orifice for limiting the flow of material through the mixer and means for biasing said gate toward a closed position with respect to said discharge orifice with increasing bias as the gate is opened, said biasing means comprising a fixed member external of the mixer body and a biased tie connected to said fixed member and to said gate.

2. In a continuous mixer, the combination of a mixer body, an agitator disposed within the body, said body having an inlet orifice for the delivery of material to the body for mixing by said agitator and a discharge orifice for the delivery of mixed material from the body, and means to control the delivery of mixed material from the body through said discharge orifice comprising a gate in the discharge orifice for limiting the flow of material through the mixer and means for biasing said gate toward a closed position with respect to said discharge orifice with increasing bias as the gate is opened, said biasing means comprising a fixed member external of the mixer body, a cable connected to said fixed member and to said gate, and a weight suspended on said cable.

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