July 1, 1958 A. J. COSMETTO 2,841,370

BLENDING MACHINE AND METHOD

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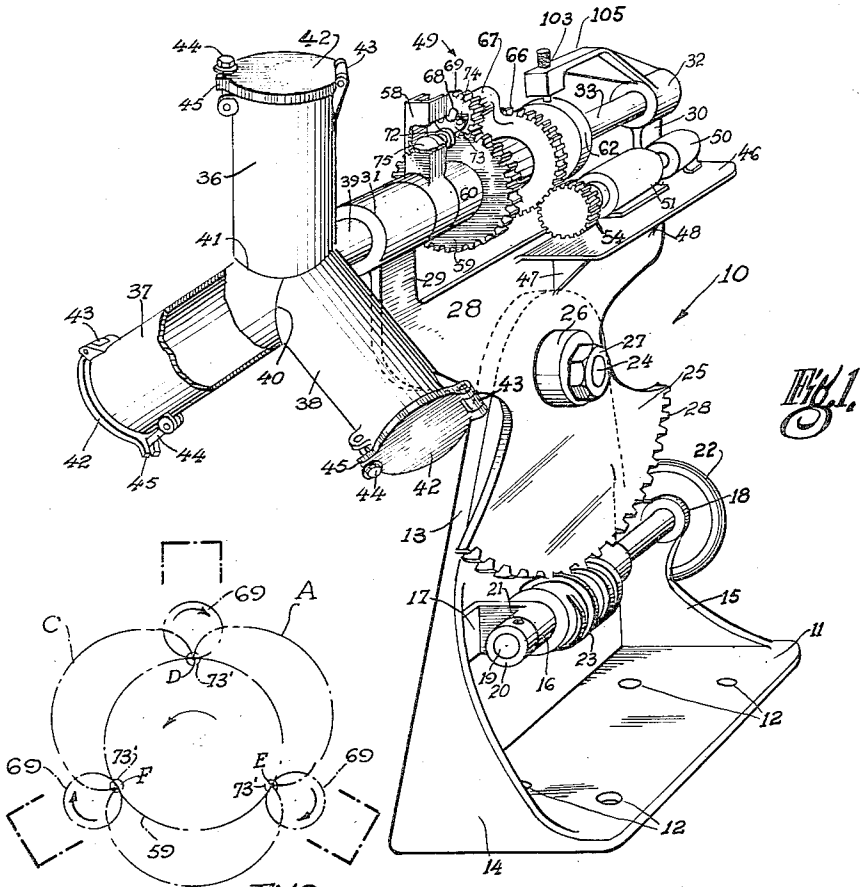


Fig. 1.

Fig. 2.

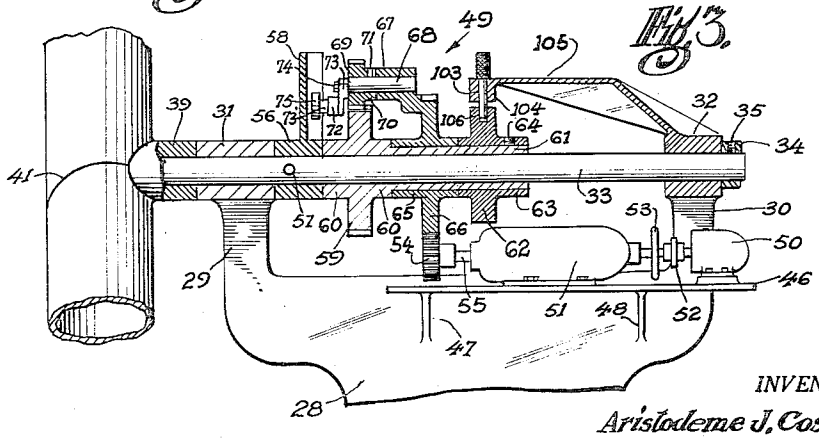


Fig. 3.

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Fig. 4.

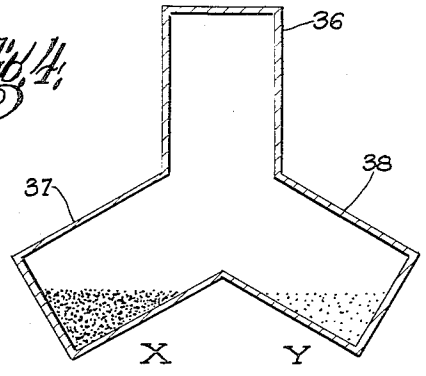


Fig. 5.

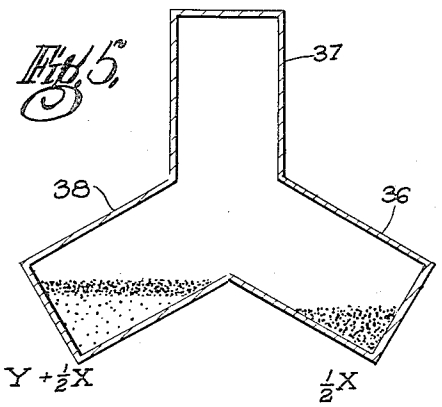


Fig. 6.

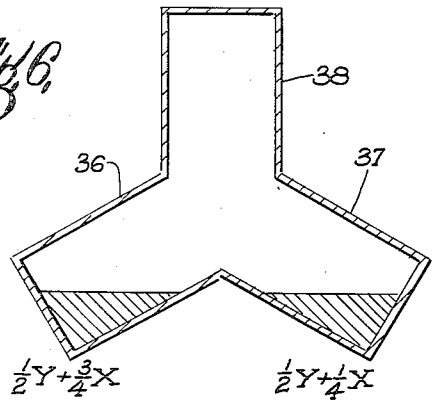


Fig. 7.

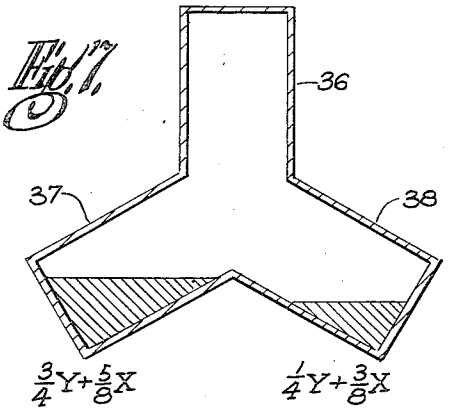


Fig. 8.

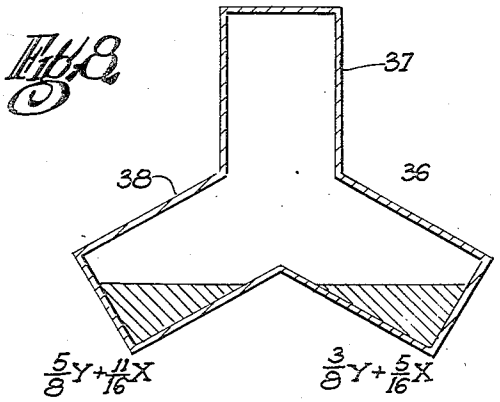
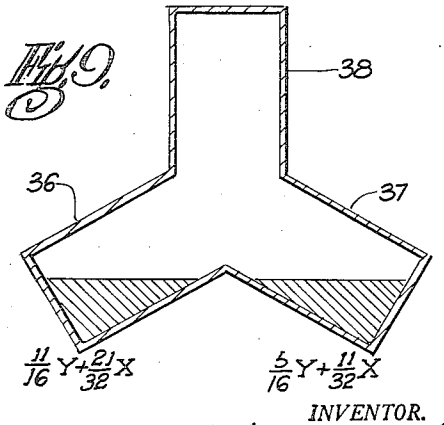


Fig. 9.



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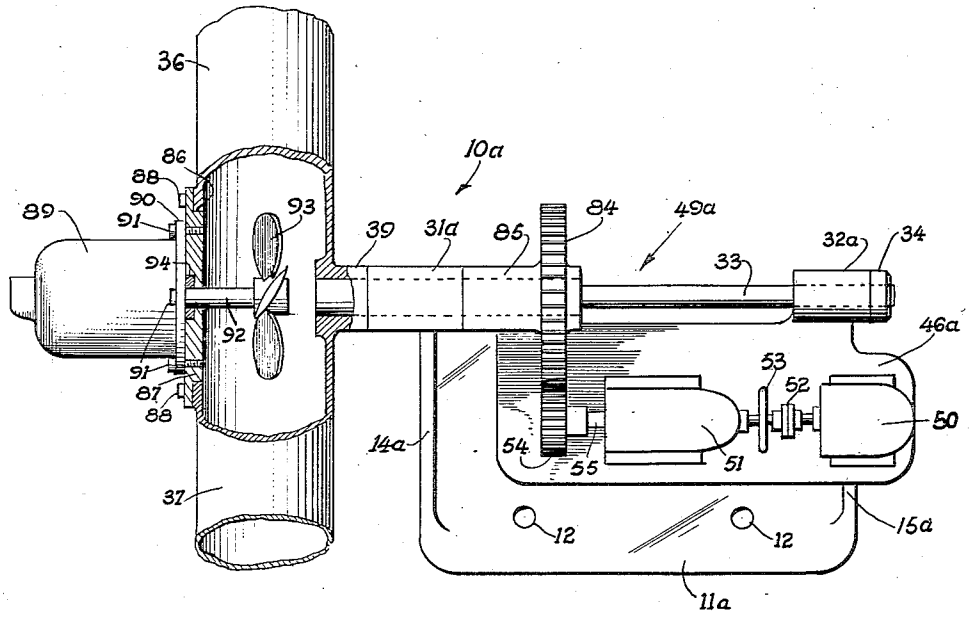


Fig. 10.

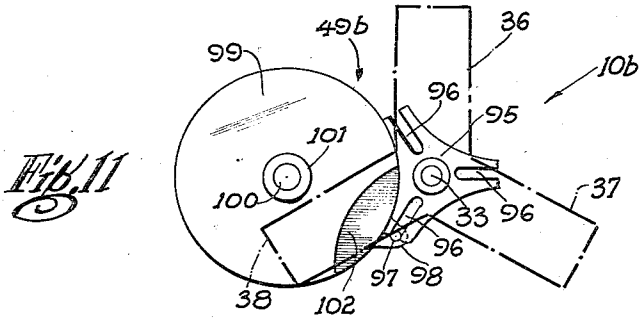


Fig. 11.

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BLENDING MACHINE AND METHOD

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17 Claims. (Cl. 259—89)

This invention relates to material mixing or blending devices and method and more particularly to such devices adapted to be used in blending wet or dry materials normally difficult to mix.

It is an object of the present invention to provide a rotary or tumbler type blending mill having equi-radially spaced containers which when rotated tumble the contents thereof in a novel manner so as to provide a more effective blending of the material, representing the practical application of the laboratory method of hand blending known as quartering, which consists in repeatedly splitting an initially non-homogeneous mass along an ever changing axis, and recombining the portions thus obtained in an ever varying manner.

It is another object of the present invention to provide a blending mill of the above type including means for imparting intermittent rotary motion to the containers, the angular velocity of this motion varying from zero to a maximum and vice versa, and effecting thereby a more efficient mixing of the container contents than would be effected by continuous motion.

It is another object of the present invention to provide a blending mill of the above type which embodies a practical application of the mathematical curve known as the epicycloid, this being the curve traced by a point on a circle as the latter revolves on the outside of another fixed circle.

Other objects of the present invention are to provide a blending mill bearing the above objects in mind which is of simple construction, inexpensive to manufacture, has a minimum number of parts, is easy to use and efficient in operation.

For other objects and a better understanding of the invention, reference may be had to the following detailed description taken in connection with the accompanying drawing, in which:

Figure 1 is a perspective view of a blending mill embodying the features of the present invention with one of the containers shown partly broken away;

Fig. 2 is a motion diagram illustrating the manner in which the intermittent rotary motion is imparted to the device by the application of the mathematical curve known as the epicycloid;

Fig. 3 is a longitudinal sectional view through the drive mechanism of the device;

Fig. 4 is a diagrammatic view showing the initial disposition of the contents of the mill;

Fig. 5 is a view similar to Fig. 4 showing the disposition of the contents after one-third of the cycle;

Fig. 6 is a view similar to Fig. 4 but showing the disposition of the contents after two-thirds of the cycle;

Fig. 7 is a view similar to Fig. 4 showing the disposition of the contents after one complete cycle;

Fig. 8 is a view similar to Fig. 4 showing the disposition of the contents after one and one-third cycles;

Fig. 9 is a view similar to Fig. 4 showing the disposition of the contents after one and two-thirds cycles;

Fig. 10 is a top plan view of a modified form of the present invention shown partly broken away; and

Fig. 11 is a diagrammatic view showing a still further modified form of the present invention.

Referring now more in detail to the drawings, in which similar reference numerals identify corresponding parts throughout the several views, there is shown a blending device referred to collectively as 10 and including a base 11, substantially as illustrated.

The base 11 is provided with suitable countersunk openings 12 by means of which it may be fixedly mounted upon a supporting surface and is integrally formed along one longitudinal edge with a vertical supporting member 13. Brackets 14 and 15 are integrally formed along the lateral edges of base 11 and the sides of member 13, serving to reinforce the latter.

A bearing 16 is integrally formed with a right angle bracket 17 by means of which it is suitably secured to the face of member 13 adjacent the base 11, while the brace 15 is integrally formed with a bearing 18 aligned with the bearing 16.

A shaft 19 is rotatably mounted in bearings 16 and 18, a sleeve 20 secured to one end of shaft 19 by means of a set screw 21 preventing displacement of shaft 19 through bearing 16 in one direction, while a manually operable dial or wheel 22 suitably secured to the other end of the shaft prevents displacement of the latter through bearing 18 in the other direction, the wheel 22 serving to impart angular motion to shaft 19 when desired. A worm 23 is fixedly carried by the shaft 19 intermediate bearings 18 and 16.

The upper end of member 13 is provided with an opening which receives a bolt 24, the head of bolt 24, not shown, being disposed adjacent the face of member 13 remote from base 11, as shown in Fig. 1. A segment gear 25 having a hub 26 is rotatably mounted on bolt 24 and secured thereon by nut 27, the segment gear 25 being provided with teeth 28 which mesh with the worm 23, substantially as illustrated.

The side of segment gear 25 remote from teeth 28 is integrally formed with a lateral extension 28, the top edge of extension 28 at each end thereof being integrally formed with upwardly extending arms 29 and 30 which terminate in bearings 31 and 32, respectively, the bearings 31 and 32 being aligned longitudinally with each other.

A shaft 33 is rotatably mounted in bearings 31 and 32, longitudinal displacement of the shaft 33 through bearing 32 in one direction being prevented by a sleeve 34 secured to the shaft 33 by means of a set screw 35 (see Fig. 3).

A container comprising leg portions 36, 37 and 38 is secured to the other end of shaft 33 in suitable manner by means of a hub 39. The leg portions 37 and 38 are of frustro-cylindrical form relatively disposed with their cylindrical axes intersecting. Thus, the plane of juncture between the cylindrical legs 37 and 38 is disposed at an acute angle to the cylindrical axis of each leg 37 and 38, the line of juncture connection between the leg portions 37 and 38 being effected by suitable means, as for example welding 40. The apex of leg portions 37 and 38 is truncated and the inner end of cylindrical member 36 secured thereto by means of welding 41, as shown in Fig. 1. It will be noted that the longitudinal axes of the three leg portions 36, 37 and 38 are disposed 120 degrees apart, in other words, the cylindrical portions are equally spaced radially.

The inner ends of the cylindrical leg portions 36, 37 and 38 are open, effecting communication between the three cylinders for a purpose which will hereinafter become clear. The outer ends of the leg portions 36, 37 and 38 are provided with covers 42 hingedly mounted at 43, the sides of covers 42 remote from hinges 43 being

releasably secured to their respective cylinders by means of pivoted bolts 44, the heads of which each engage a slotted lug 45 in each of the covers 42 as will be obvious.

The lateral extension 28 of rake gear 25 is integrally formed with a horizontal platform 46 on the face adjacent base 11, the platform 46 being supported by brackets 47 and 48.

A mechanism, referred to collectively as 49, is mounted on platform 46 and shaft 33. The purpose of the mechanism 49 is to produce an intermittent rotary motion which will start and stop the driven shaft 33 without shock and yet keep it under positive control throughout the cycle. Thus, the leg portions 36, 37 and 38 will have imparted thereto rotary motion, the angular velocity of which varies from zero to a maximum and vice versa, each leg portion rotating through 120 degrees in an intermittent manner. This motion is obtained by the practical application of the mathematical curve known as the epicycloid, which is the curve traced by a point on a circle as the latter revolves on the outside of another fixed circle.

Tests have shown that the mixing or blending of different powders or material is much more efficiently achieved when the aforesaid intermittent rotation is applied to the leg portions 36, 37 and 38 as compared with continuous rotary motion.

The mechanism 49 includes a motor 50 mounted at one end of platform 46 and connected to a speed reducer 51 by means of a connector 52, as shown in Fig. 3. A speed regulator 53 is provided. A driver gear 54 is mounted on the output shaft 55 of reducer 51.

A sleeve 56 is secured to shaft 33 adjacent bearing 31 by means of a pin 57, the sleeve 56 being integrally formed with a radial, three-sided column 58 open on its side remote from leg portions 36, 37 and 38. Sun gear 59 having a hub 60 is rotatably mounted on shaft 33 adjacent sleeve 56 and column 58, the sleeve or hub 60 on the side remote from sleeve 56 being integrally formed with an elongated sleeve 61. The gear 59, hub 60 and sleeve 61 are free to rotate relative to the shaft 33 and column 58.

A locking disc 62 is fixedly mounted on the end of sleeve 61 remote from gear 59 by means of an integrally formed hub 63 and a set screw 64, as shown in Fig. 3.

A sleeve 65 is rotatably mounted on sleeve 61 intermediate gear 59 and disc 62 and is integrally formed with a gear 66, the gear 66 being in mesh with the driven gear 54. The face of gear 66 adjacent gear 59 is integrally formed with a gearing 67, the longitudinal axis of which is parallel to shaft 33. A shaft 68 is rotatably mounted within bearing 67, one end of shaft 68 extending beyond bearing 67 toward column 58. A planetary gear 69 is fixedly mounted on this extended end of shaft 68, as shown in Fig. 3, the planetary gear 69 being in mesh with the gear 59. The radius of planetary gear 69 is one-third that of gear 59 for a purpose which will hereinafter become clear.

A crank arm 72 is fixedly secured to planetary gear 69, substantially as illustrated.

The crank arm 72 rotatably mounts a pin 73', the longitudinal axis of which lies on the pitch circle of gear 59 for a purpose which will hereinafter become clear. A roller 75 is rotatably mounted on the end of pin 73' within column 58.

Thus, the gear 54 which revolves at a continuous constant rate drives gear 69.

A release pin 103 is slidably mounted within a bearing member 104, the latter being fixedly mounted by bracket 105. The pin 103, when in its lower, operative position, is received within an opening 106 provided in the disc 64, locking gear 59.

In operation, with the pin 103 within opening 106, the drive shaft 55 and gear 54 impart continuous rotary motion to gear 66. The sun gear 59, it will be noted, is locked by pin 103 and is therefore forced to remain stationary. Thus, the planetary gear 69 is forced by gear 66 to revolve around sun gear 59, and in so doing forces roller 75 to describe an epicycloidal curve, thus imparting the desired indexing motion to driving arm 58 and shaft 33.

The gear 59 is diagrammatically shown in Fig. 2 in broken lines. The rotation of gear 54 is such as to impart clockwise motion to gear 66. This occasions the rotation of planetary gear 69 in a clockwise direction about shaft 68, the planetary gear 69 being shown in broken lines diagrammatically in Fig. 2. Since the sleeve 65 is rotatably mounted on sleeve 61, the planetary gear 69 will also revolve about shaft 33 around the periphery of fixed gear 59. Since the radius of gear 69 is one-third that of gear 59, the gear 69 will make three complete revolutions about shaft 68 per revolution about shaft 33, and fixed gear 59, as shown in Fig. 2.

The pin 73' is also shown in broken lines in Fig. 2, it being noted that the center of pin 73' lies on the pitch circle of fixed gear 59. Thus, during the revolution of planetary gear 69 about fixed gear 59, the pin 73' and roller 75 will follow the epicycloids A, B and C, shown in Fig. 2. The column 58 is driven by roller 75, to drive shaft 33 with the desired intermittent rotary or indexing motion.

Thus, it will be seen from Fig. 2, that the centers of pin 73' and roller 75 trace the epicycloids A, B and C shown by the broken curves. As the driver gear 54 rotates, the angular velocity of the centers of the pin 73' and roller 75 and thereby the column 58 gradually increase from the zero points D, E and F, reaching a maximum angular velocity greater than that of the gear 54, beyond this maximum point the angular velocity of the roller and pin centers and the column 58 gradually being reduced again to zero in the manner indicated. Since the planetary gear is one-third the diameter of gear 59, three such epicycloid paths A, B and C occur during each revolution of the gear 69 about gear 59. Thus, each of the leg portions 37, 36 and 38, starting from the zero position of Fig. 1, will rotate through one hundred twenty degrees, the angular velocity increasing from zero to a maximum halfway through the one hundred twenty degrees and then decreasing again to zero at the end of the one hundred twenty degree movement.

Tests have shown that the aforesaid intermittent rotary motion, the angular velocity of which varies from zero to a maximum and vice versa results in a more intimate and efficient mixing of material than would be the case if merely continuous motion were applied, as will hereinafter be explained more in detail.

The shaft 33 and associated parts may be inclined at an angle to the horizontal by rotation of wheel 22 which rotates gear 25 about bolt 24 by means of worm 23, when such angulation is desired.

Figs. 4 through 9 show successive stages during the mixing process. For example, Fig. 4 shows the zero position of the device (see Fig. 1) with a black powder x disposed in leg portion 37 and a white powder y disposed within leg portion 38. After one-third of a revolution, the portion 37 moves up to the position formerly occupied by portion 36, as shown in Fig. 5. This causes the material x to drop downwardly and to separate equally into portions 36 and 38. Thus, portion 36 contains one-half x while portion 37 contains y plus one-half x. Upon a further one-third revolution, as shown in Fig. 6, the portion 38 moves up to the inverted vertical position and the contents thereof become equally distributed between portions 36 and 37, due to gravity. Thus, the portion 36 contains one-half y plus three-quarter x while portion 37 contains one-half y plus one-quarter x. It will be apparent that as the process is continued and the portions 36, 37 and 38 continue to rotate in the aforesaid manner that the material disposed in the two lowermost portions will ultimately become equally distributed and of substantially the same composition. For example, the percentage of y

in each container will approach the percentage of x in the same container, as will be obvious. It will be appreciated however, that the above mathematical description of the blending is only approximated in practice, because of other factors.

Some materials, however, due to their density and other physical properties will be more efficiently mixed when the device rotates continuously. To switch the device from intermittent rotary motion of the aforesaid type to continuous rotary motion, it is only necessary to remove release pin **103** from opening **106**. This releases locking disc **62** and thereby sun gear **59**. Under operating conditions, the gear **66** will drive planetary gear **69** around the sun gear **59** until the centerline of roller **75** assumes a neutral position relative to the axis of crank shaft **68**. The entire assembly of gear **59**, gear **66**, roller **75**, crank arm **72** and planetary gear **68** then becomes self-locking and drives column **58** and shaft **33** at the same constant angular velocity of gear **66**.

To convert the mechanism again to intermittent rotary motion, it is only necessary to insert the pin **103** into opening **106** in disc **62**, as will be obvious.

Referring now particularly to Fig. 10, there is shown a modified form of the present invention, referred to collectively as **10***a*, and differing from the first form in the replacement of the mechanism **49** by a mechanism **49***a* adapted for continuous motion only and in the addition of means for breaking up large masses of material at the juncture of the leg portions **36**, **37** and **38**.

In this form the base **11***a* now fixedly supports a platform **46***a* by means of a vertical member, not shown, the member **11***a* being integrally formed with brackets **14***a* and **15***a* which support the aforesaid vertical member. The vertical member is provided at its top edge with bearings **31***a* and **32***a* vertically spaced above the platform **46***a* and which rotatably mount a shaft **33**. A sleeve **34** is fixedly secured to shaft **33** at one end and prevents longitudinal displacement of the latter through bearing **32***a* in one direction.

The leg portions **36**, **37** and **38** are again mounted at the other end of shaft **33** adjacent bearing **31***a* by means of hub **39** suitably secured to the shaft **33**, as in the first form.

The mechanism **49***a* includes the motor **50** connected to the speed reducer **51** by means of connector **52**, a speed regulator **53** being provided. The drive gear **54** is fixedly carried on output shaft **55** of reducer **51** and is in mesh with a driven gear **84** fixedly mounted on shaft **33** adjacent bearing **31** by means of a hub **85**. Thus, upon operation of motor **50** continuous rotary motion will be imparted to shaft **33** and leg portions **36**, **37** and **38**.

As a means of breaking up agglomerations of large material, the juncture of leg portions **36**, **37** and **38** on their sides remote from the mechanism **49***a* are provided with a circular opening **86** in which is secured a shoulder plate **87** by means of bolts **88**. A motor **89** is secured to plate **87** by means of flange **90** and bolts **91**, substantially as illustrated, the drive shaft **92** of motor **89** extending through the plate **87** to the interior of leg portions **36**, **37** and **38** and mounting a propeller **93**. A bushing **94** surrounds shaft **92** within plate **87**.

Thus, during operation of mechanism **49***a* and rotation of leg portions **36**, **37** and **38**, large agglomerations of material passing from one leg portion to the other will be broken up by the rotating propeller **93**, facilitating the mixing operation. It will be noted that by unscrewing the bolts **88** that the plate **87** and motor **89** may be removed as a unit and replaced by a plain cover plate, not shown, if so desired.

Referring now more particularly to Fig. 11, there is shown a still further modified form of the present invention, referred to collectively as **10***b* and differing from the forms **10** and **10***a* in the replacement of mechanisms **49** and **49***a* by a geneva mechanism, referred to collectively as **49***b*.

In this form a geneva **95** is fixedly carried by the shaft **33**, which latter in turn fixedly carries the leg portions **36**, **37** and **38**. The geneva **95** is provided with three inwardly extending, elongated slots **96** in which successively rides a pin **97**, rotatably carried by a lug **98** mounted on the periphery of a continuously rotating wheel **99**, this wheel being fixedly mounted on the driven shaft **100** by means of hub **101**. As will be obvious from an inspection of Fig. 8, one-third of a revolution will occur as the pin **97** rides from one end of a slot **96** to the other, after which the pin **97** will leave the slot and rotate until it engages the next slot, after which the process will again be repeated. In this form, there is a relatively long cam dwell between movements of the geneva **95**. The wheel **99** is provided with an arcuate cut out portion **102** permitting movement of the geneva **95**.

It will be noted that by means of the hand wheel **22** the shaft **33** and associated parts may be tilted to the horizontal and retained in such tilted position during the operation of the device **10**. Thus, when the apparatus is in the position of Fig. 1, with the shaft **33** in a substantially horizontal position, the direction of fall of the particles will be substantially vertical from the uppermost container and the distance over which the particles move will be greatest in a vertical direction. In other words, the vertical position of the containers **36**, **37** and **38** and the intermittent rotary motion insure a sharp drop of the mass, with a powerful action. However, when the shaft **33** is tilted from the horizontal, it will be apparent that the containers will be inclined to the vertical and that the vertical dropping distance will decrease during operation. This more or less inclined position slows the drop of the mass, and so does the continuous motion. There is more rolling and "folding" and sliding than ripping apart, thereby preserving delicate crystal shapes by means of a softer action, but still and always preserving the principle of successive division.

The following actions take place, in addition to the splitting of masses: rolling, folding, tumbling and shearing of layers, all contributing to the increased efficiency of the device. Thus, the device combines an effective "split stream" action with a tumbling, rolling and folding movement, resulting in a mixer of greatly increased efficiency.

The blending mass splits, rolls and folds during each one-third of a revolution with fewer revolutions being required to effect perfect blending, thus effecting an economy of power.

While various changes may be made in the detail construction, it shall be understood tha such changes shall be within the spirit and scope of the present invention as defined by the appended claims.

I claim:

1. A blending device comprising three equiradially spaced containers connected at their inner ends, the inner ends of said containers being open and adapted to permit communication between the interiors of said containers, means for mounting said containers for intermittent rotary motion about an axis passing through their intersecting ends and adapted to successively move each of said containers into an upper, substantially vertical position, said mounting means comprising a rotatably mounted shaft, said containers being fixedly mounted at one end of said shaft at their inner ends, a radial column fixedly mounted on said shaft, said column being hollow and open at one side, a sun gear having an elongated sleeve on the side thereof remote from said column, and rotatably supported on said shaft, a locking disk fixedly mounted on the end of said sleeve remote from said sun gear, a second sleeve rotatably mounted on said first sleeve intermediate said sun gear and locking disk, a driven gear fixedly carried by said sleeve, means imparting

continuous rotary motion to said driven gear, a bearing on the face of said driven gear adjacent said sun gear, the longitudinal axis of said bearing extending parallel to said shaft, a second shaft rotatably mounted in said bearing and extending beyond said bearing at an end thereof adjacent said column, a planetary gear mounted on said second shaft in mesh with said sun gear, a crank arm fixedly carried by said planetary gear, a pin rotatably mounted at the end of said crank arm, said pin being disposed with the longitudinal axis thereof substantially parallel to said first shaft and lying on the fixed circle of said sun gear, a roller mounted at the end of said pin within said column and releasable means for locking said disk in stationary position.

2. A blending device according to claim 1, said releasable means comprising a stationary bearing member adjacent the periphery of said disk, a release pin slidably mounted within said bearing member, said disk at the periphery thereof having an opening adapted to be aligned with the bearing member and pin whereby to receive the latter.

3. A blending device comprising three hollow cylindrical containers in the same plane, radially spaced at equal angles with respect to each other and connected at their inner ends, the inner ends of said container being open and adapted to permit communication between the interiors of said containers, the outer ends of said containers being closed, a removable cover on the outer end of at least one of said containers and means for mounting said containers causing intermittent rotary motion in a three step cycle about an axis substantially perpendicular to the plane of the containers, each step of the cycle consisting of a rotation equal to one-third of a revolution of said axis so as to successively rotate each of said containers into a substantially vertical position.

4. A blending device as in claim 3 whereby said containers are stationary when in said vertical position.

5. A blending device as in claim 4 wherein all three of the outer ends of said containers have removable covers.

6. A blending device as in claim 3 including means for inclining the axis of rotation of said device at a small angle to the horizontal.

7. A blending device as in claim 3, said mounting means including a releasable means for converting said intermittent motion to continuous motion.

8. A blending device comprising three hollow cylindrical containers in the same plane, radially spaced at equal angles with respect to each other and connected at their inner ends, the inner ends of said container being open and adapted to permit communication between the interiors of said containers, the outer ends of said containers being closed, a removable cover on the outer end of at least one of said containers, means for mounting said containers for a rotation about an axis substantially perpendicular to the plane of the containers, means for causing intermittent rotation and means for causing continuous rotation of said containers about said axis, said means for causing intermittent motion consisting of a three step cycle, each step of the cycle equal to an angular rotation of substantially 120°.

9. A blending device comprising three hollow cylindrical containers in the same plane, radially spaced at equal angles with respect to each other and connected at their inner ends, the inner ends of said container being open and adapted to permit communication between the interiors of said containers, the outer ends of said containers being closed, a removable cover at the outer end of at least one of said containers and means for mounting said containers causing an intermittent rotation through said equal angles about an axis substantially perpendicular to the plane of the containers, each container being successively rotated to three stationary positions by a three step intermittent cyclic rotation of said axis, each step of the cyclic rotation being equal to one-third of a revolution of the said axis.

10. A blending device as in claim 9 wherein one of said stationary positions is substantially vertical.

11. A blending device comprising three hollow cylindrical containers in the same plane, radially spaced at substantially equal angles of 120° with respect to each other and connected to their inner ends, the inner ends of said containers being open and adapted to permit communication between the interiors of said containers, the outer ends of said containers being closed, a removable cover at the outer end of at least one of said containers and means for mounting said containers causing an intermittent rotation through said angles about an axis perpendicular to the plane of the containers, each container being successively rotated to a substantially vertical stationary position.

12. A blending device comprising three hollow cylindrical containers in the same plane, radially spaced so that the extension of the center axis of one container will bisect the angle formed between the center axes of the other containers and connected at their inner ends, the inner ends of said containers being open and adapted to permit communication between the interiors of said containers, the outer ends of said containers being closed, a removable cover at the outer end of at least one of said containers and means for mounting said containers causing a three step cyclic rotation about an axis perpendicular to the plane of the containers, wherein each container is successively rotated to a substantially vertical stationary position and each step of the cyclic rotation constitutes one-third of a revolution of said axis.

13. A blending device including three hollow cylindrical containers in the same plane, radially spaced so that the extension of the center axis of one container will bisect the angle formed between the center axes of the other containers and connected at their inner ends, the inner ends of said containers being open and adapted to permit communication between the interiors of said containers, the outer ends of said containers being closed, a removable cover at the outer end of at least one of said containers and means for mounting said containers causing a three step cyclic rotation about an axis perpendicular to the plane of the containers, wherein each container is successively rotated to a substantially vertical stationary position and each step of the cyclic rotation constitutes one-third of a revolution of said axis, said mounting means comprising a three arm geneva fixedly mounted on a shaft, said containers at their inner ends being fixedly mounted on said shaft at one side thereof, each of said arms having inwardly extending slots, a wheel rotatably mounted adjacent said geneva, a pin carried at the periphery of said wheel and adapted to ride in said inwardly extending slots and means for driving said wheel with a continuous rotary motion.

14. A blending device including three hollow cylindrical containers in the same plane, radially spaced so that the extension of the center axis of one container will bisect the angle formed between the center axes of the other containers and connected at their inner ends, the inner ends of said containers being open and adapted to permit communication between the interiors of said containers, the outer ends of said containers being closed, a removable cover at the outer end of at least one of said containers and means for mounting said containers causing a three step cyclic rotation about an axis perpendicular to the plane of the containers, wherein each container is successively rotated to a substantially vertical stationary position and each step of the cyclic rotation constitutes one-third of a revolution of said axis, said containers on their sides remote on said mounting means at their intersecting ends having an opening, a plate removably secured within said opening, a drive shaft rotatably mounted in said plate and extending into said containers, disintegrating means mounted on one end of said shaft at the inside of

said containers and means for driving said shaft mounted on the side of said plate remote from said disintegrating means.

15. The method of blending masses comprising placing the masses to be mixed in containers, rotating the containers about an axis through a three step cycle so that the mass in a vertically positioned container will fall downward, dividing itself into the other two containers, rotating the containers so that once during the three step cycle each container will be in the vertical position to release its mass and so that twice during the three step cycle each container will be in a position to receive the mass being released, repeating the three step cycle so as to continuously redivide and recombine the masses so formed whereby to approach a perfect blend.

16. A blending device, according to claim 8, said containers on their sides remote from said mounting means at their intersecting ends having an opening, a plate removably secured within said opening, a drive shaft rotatably mounted in said plate and extending into said containers, disintegrating means mounted on one end of said

shaft at the inside of said containers, and means for driving said shaft mounted on the side of said plate remote from said disintegrating means.

17. A blending device according to claim 5, said mounting means comprising a three-armed geneva fixedly mounted on a shaft, said containers at their inner ends being fixedly mounted on said shaft at one side thereof, each of said arms having inwardly extending slots, a wheel rotatably mounted adjacent said geneva, a pin carried at the periphery of said wheel and adapted to ride in said inwardly extending slots, and means for driving said wheel with a continuous rotary motion.

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