M. M. FREDEL AND W. BOSANKO.

AGITATOR.

APPLICATION FILED FEB. 23, 1921.

1,383,921.

Patented July 5, 1921.

2 SHEETS—SHEET 1.

Fig. 1

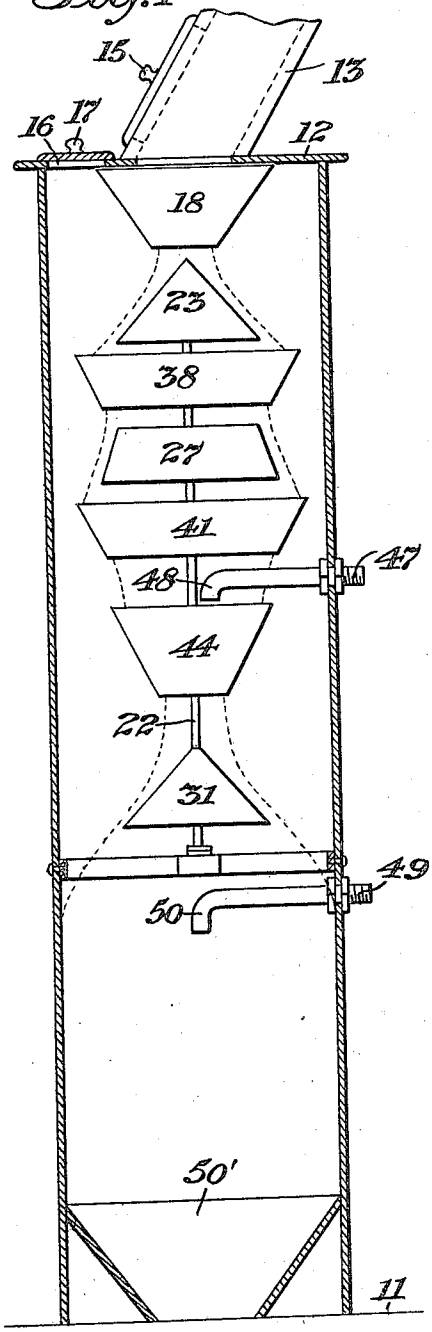
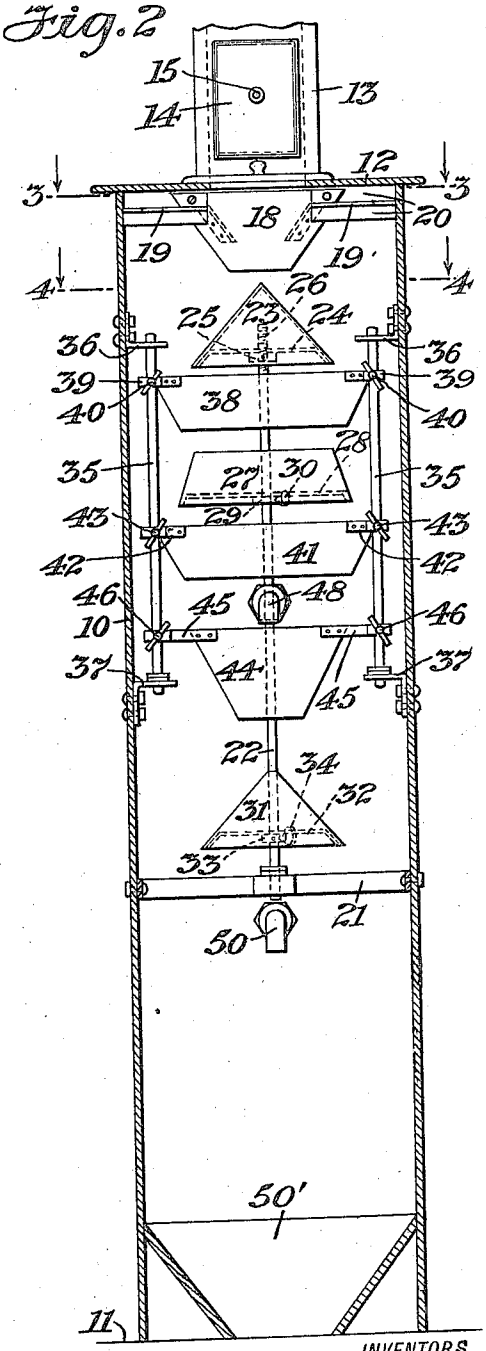


Fig. 2



INVENTORS

Michael M. Fredel

William Bosanko

BY

THEIR ATTORNEYS

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2 SHEETS—SHEET 2.

Fig. 5

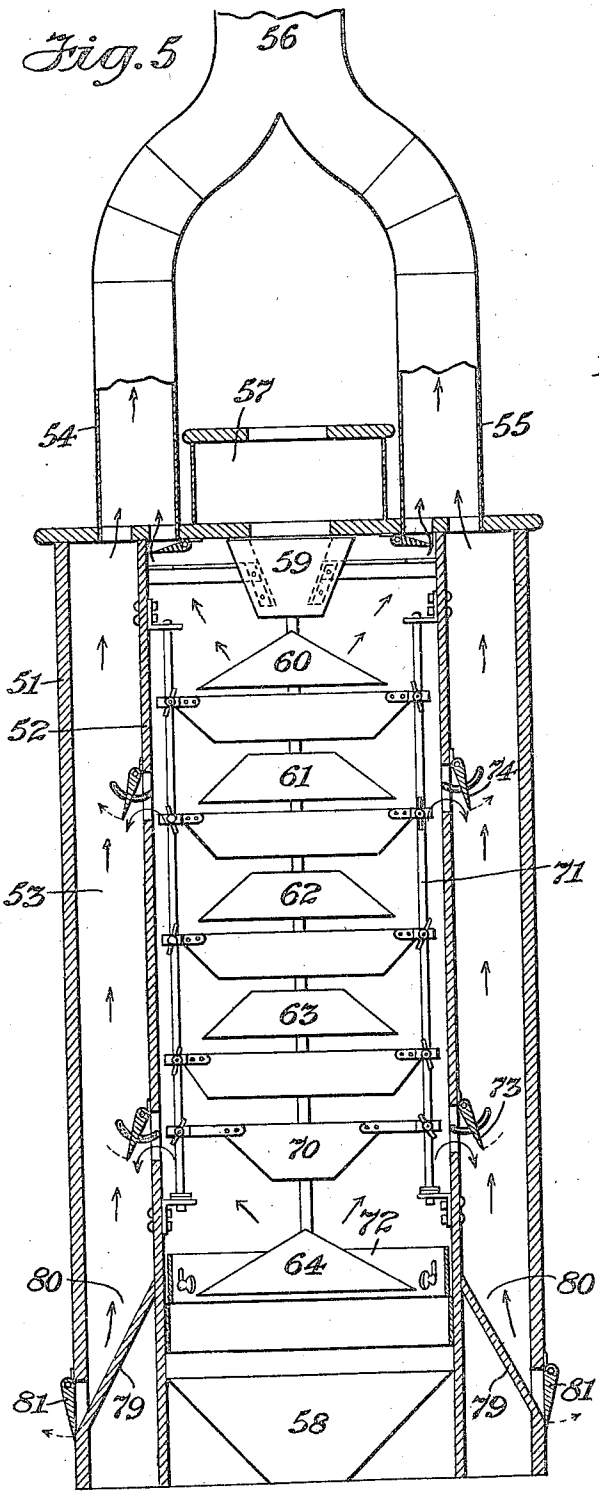


Fig. 3

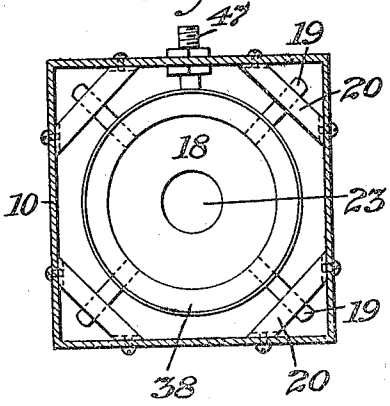
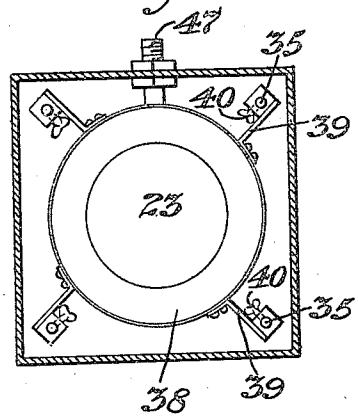


Fig. 4



INVENTORS.
Michael M. Fredel
William Bosanko
BY
THEIR ATTORNEYS

UNITED STATES PATENT OFFICE.

MICHAEL M. FREDEL, OF BROOKLYN, AND WILLIAM BOSANKO, OF RICHMOND HILL, NEW YORK.

AGITATOR.

1,383,921. Specification of Letters Patent. Patented July 5, 1921.

Application filed February 23, 1921. Serial No. 447,080.

To all whom it may concern:

Be it known that we, MICHAEL M. FREDEL and WILLIAM BOSANKO, both citizens of the United States, residing, respectively, in the borough of Brooklyn, county of Kings, city and State of New York, and Richmond Hill, borough of Queens, State of New York, have invented an Improvement in Agitators, of which the following is a specification.

Our invention relates to an agitator and particularly to that type of agitators employed in mills for successively turning over and bringing to the surface particles of flour or other similar material in order to bleach the same by bringing the surface particles into contact with a suitable gas employed for this purpose, or, as will be apparent, to otherwise treat material in passing through the agitator. Heretofore, as we are aware, various forms of agitators to which our present invention relates have been used for the same purpose. Among these agitators some of the same have been provided with a plurality of power driven cages placed within the agitator so that during the descent of the material being treated the same is turned over to bring different particles thereof to the surface for treatment. Also we are aware that it has heretofore been proposed to permit the material under treatment in its descent in the agitator to be thrown in opposite directions by transversely arranged plates placed at an angle and in superimposed positions. In the use of these agitators, however, it has been found that the diffusion is incomplete and consequently unsatisfactory, and furthermore these agitators with which we have been heretofore acquainted the material under treatment is retarded in its flow, tending to choke the agitator and hence materially interfere with the quantity of material which may be handled by the agitator in a given time period.

The object of our invention is to overcome these difficulties, and in carrying out the invention we aim to provide an agitator in which the diffusion of the material is substantially perfect by dividing the material into a conical formation and in this form causing a plurality of reversals during its course through the agitator with which no motive power is required and in which the construction is such that the flow of the material is not retarded and the agitator will not choke so that in the use of the machine it is possible to satisfactorily diffuse the material irrespective of the rate at which the same is permitted to flow through the apparatus.

The agitator made in accordance with our invention preferably comprises a casing mounted in a vertical position in a chute or line through which the flour or other material that is to be treated is caused or permitted to pass by gravity. Upon entering the agitator the material under treatment is caused to take the form of a substantially cylindrical body, and by suitable devices adjustably and removably arranged in the casing as hereinafter described, the material is diffused in its passage through the agitator by being directed both outwardly and inwardly relatively to the axis of the agitator a sufficient number of times to perfect the diffusion. It will furthermore be understood that while the principal form of the invention, as hereinafter described, relates particularly to a form of agitator, the invention is not limited to this particular use, as for example it may be utilized with equal advantage as an aspirator for separating grain or other material from chaff and other dirt as well as for manifest other purposes.

In the drawing:

Figure 1 is a side elevation of an agitator made in accordance with our invention.

Fig. 2 is a central longitudinal cross section of the apparatus.

Fig. 3 is a sectional plan on line 3—3, Fig. 2.

Fig. 4 is a sectional plan on line 4—4, Fig. 2, and

Fig. 5 is a longitudinal sectional elevation showing another form of the invention.

Referring to the drawing and particularly to Figs. 1 to 4, the agitator made in accordance with our invention comprises a box frame or casing indicated at 10 and made of any suitable material. The casing rests on a floor or other support as indicated at 11 and at the other end is provided with a top 12 adapted to be connected to a chute 13 in the flour line or the line of other material and in which there is provided a door 14 having a knob 15 by which, or otherwise, the door may be opened. As illustrated in the drawing, the top member is also provided with a door 16 having a knob 17 by which, or otherwise, this door may be removed to gain

access to the upper interior portion of the casing.

Within the casing and at the upper end adjacent the top thereof we employ a deflector 18 which is preferably in the form of a truncated cone. This deflector 18 is fitted with a plurality of arms 19 extending outwardly therefrom and adapted to be engaged in suitable supports 20 so as to make the deflector 18 adjustable to position in the top of the casing. This is necessary in order to determine the proper place for the deflector relatively to the opening in the top 12 which is connected to the chute 13 and through which the flour or other material enters, the adjustment being determined, as will be understood, by the quantity of flour or other material which at a given time is being handled by the agitator.

In a suitable position in the casing we provide a cross bar 21 which is fixed in place therein in any suitable manner. This cross bar 21 supports an upright rod 22 which extends from the cross bar upwardly in a centrally disposed position through the casing and terminates at a point spaced from, but relatively near, the discharge orifice of the deflector 18. At the upper end of this rod 22 there is a deflector cone 23. Interiorly this deflector cone is fitted with a spider 24 having a hub 25 which is tapped to be adjustably received on the screw threaded upper end 26 of the rod 22 so that the distance between the apex of the cone and the discharge orifice of the deflector 18 may also be adjusted, depending upon the quantity of material which is being handled at any given time by the deflector. On the rod 22 there is also mounted a deflector 27. This is preferably a truncated cone and the walls thereof taper downwardly at a predetermined angle. Interiorly the deflector 27 is fitted with a spider 28 having a hub 29 for receiving the rod 22 and the hub 29 is fitted with a set screw 30 by which, as will be understood, the position of the deflector 27 on the rod 22 may be readily determined. Also on the rod 22 adjacent the lower end thereof and appreciably above the cross bar 21, we employ a deflector cone 31. This is provided interiorly with a spider 32 having a centrally disposed hub 33 in which there is a set screw 34 by which the position of the deflector cone 31 may be adjusted and secured in position on the rod 22. As will be understood, however, while we have shown deflector cones at the top and adjacent the bottom of the rod 22 and an intermediate truncated deflector cone, any predetermined number of these intermediate cones may be employed without departing from the nature and spirit of the invention.

Also within the casing we prefer to employ a plurality of rods 35 preferably four in number and placed in the corners of the casing by means of brackets 36 and 37 or otherwise. Adjustably secured on these rods we provide a plurality of truncated cones or deflectors, with the parts thereof inclined in the opposite directions to those of the deflectors hereinbefore described. One of these deflectors is indicated at 38. This is provided with brackets 39 adapted to engage the rods 35 and the set screws 40 by which the deflector may be adjusted to position on the rods. 41 indicates a similarly constructed deflector also provided with brackets 42 wherein there are set screws 43 by means of which this deflector may be vertically adjusted to the required position. As indicated in these figures of the drawing the agitator also includes a deflector 44 mounted on the rods 35. Similar to the correspondingly mounted deflectors the deflector 44 is provided with brackets 45 in which there are set screws 46 to secure the deflector in any desired position on the rods 35.

In the use of the agitator as hereinbefore described the flour or other material is forced to flow by gravity through the chute 13 into the casing. The material first enters the deflector 18 by which, after being suitably adjusted, it is directed to the conical deflector 23 over which it passes and by which it is divided into a hollow body as will be readily understood. From the cone 23 the material is caused to flow to the inner side of the deflector 38 against which it strikes and has the course of its flow changed from an outward to an inward direction. After passing through the deflector 38 the material is directed to the outer side of the deflector 37 over which it passes. Having its course again directed outwardly from the deflector the material passes to the inner side of the deflector 41 from which it passes to the deflector 44 and to the conical deflector 31 where its path is again changed to an outward direction relatively, of course, to the walls of the casing. From the conical deflector 31 the material is permitted to fall to the bottom of the casing and to pass through the hopper 50′ leading from the bottom of the casing to the chute by which the material is conveyed away from the agitator. It will be understood that the deflector 18 and the cone 23 may be adjusted relatively to one another to cause an even distribution of the flour or other material so that when it passes over and leaves the surface of the cone 23 it will be evenly distributed and in leaving the cone will do so in a hollow conical or circular body and that any number of the intermediate deflectors, both those mounted on the central upright rod 22 and the side rods 35 may be employed to adequately effect the diffusion of the material and that these parts may be adjusted to cause the material to maintain its form

of the hollow body while passing over and through the deflectors.

In the form of the invention shown in Figs. 1 to 4 there is provided a gas inlet pipe 47 passing through one of the walls of the casing and terminating in a downwardly extended nozzle 48 arranged approximately in the center of the casing with the pipe 47 passing between the deflectors 41 and 44. Also beneath the conical deflector 31 a similar gas pipe 49 may be passed through the casing and made to terminate in a downwardly extending nozzle 50 for the admission of chlorin or other gas to which the material may be subjected and with which it is diffused for bleaching or other purposes.

As hereinbefore stated it will be understood that while the form of agitator hereinbefore described is particularly adapted for use in diffusing flour its use is not so limited. It may, for example, be utilized as an aspirator for separating the chaff, dirt and other foreign substances from grain in cleaning the same, as illustrated in Fig. 5. In this form of the invention the casing is preferably made of double walls, the outer wall being indicated at 51 and the inner wall at 52. These walls are preferably parallel to one another and extend from the bottom to the top of the casing so as to provide an air space 53. Leading from the top of the aspirator so as to connect with both the interior chamber within the walls 52 and the spaces 53 there are suction pipes 54 and 55 merging in a pipe 56 to which a blower or other suitable exhaust apparatus of sufficient capacity is connected to create the desired draft in the apparatus.

The material to be treated in the aspirator is admitted at 57, being conveyed thereto by a suitable chute or otherwise and the separated material is conveyed from the aspirator by a suitable hopper 58 at the bottom thereof or otherwise. Adjustably mounted at the top of the apparatus within the central chamber or the chamber within the inner walls 52 we employ a conical deflector 59. This is preferably mounted in an adjustable manner similar to that described in the other form of the invention in regard to the deflector 18. In this form of the invention we also employ a centrally mounted upright or rod indicated at 65 and on which there are adjustably secured a deflector cone 60 and a plurality of deflector cones as indicated at 61, 62 and 63 and a bottom deflector 64. Intermediate of these deflectors there is a second series of oppositely disposed deflectors indicated at 66, 67, 68, 69 and 70 which are secured to rods 71 in an adjustable manner similar to that hereinbefore described in connection with the corresponding deflectors 38, 41 and 44 in the other form of the invention.

In the bottom of the inner chamber we employ a slide 72 which is adjustable to position to determine the amount of air admitted to the central chamber by adjusting the space between the inner surface of this adjustable slide and the periphery of the conical deflector 64, it being understood that the adjustable slide 72 may be placed in position and secured therein in any desired manner. In order to determine and regulate the strength and ratio of the air currents in the inner chamber and the spaces 53, we provide the inner walls 52, in suitable places, with doors shown, for example, at 73, and 74 and adapted to be closed or held in an open position by means of brackets 75 and 76 respectively. For the same purpose the top member is provided with doors 77 and 78 closing the openings to the pipes 55 and 54 respectively for opening the same to any desired extent. In the lower portion of the spaces 33 we employ an inclined partition wall as indicated at 79 making a pocket 80 at the bottom of the spaces 53 which is accessible from the exterior of the apparatus by means of doors shown at 81.

In the use of this aspirator apparatus the grain or other material to be cleaned is caused to pass through a suitable chute to the deflector 59 where it is divided into a hollow circularly or cylindrically disposed body by passing over the conical deflector 60. From this in the same form it passes alternately in one direction first inwardly and then outwardly through and over the series of deflectors 66 to 70 inclusive and finally passes over the conical deflector 64 to the discharge hopper 58. As will be readily apparent by the agitation effected in the material by this fall through and over the deflectors together with the air currents passing in the opposite direction the heavier materials are conveyed away to the discharge hopper and the lighter materials separated and carried off by the draft. Also that those portions of the lighter materials which settle at the bottom of the spaces 53 may be removed therefrom through the doors 81.

We have herein shown and described our invention as applied to an agitator and an aspirator as used in flour mill practice, but it will be understood that many other similar and allied uses may be found for such an apparatus, as for example it might serve admirably as a water cooling tower in which case it might be employed with or without a casing. It will also be understood that the pitch or angle of the deflectors depends upon the use to which the apparatus is put, the pitch being much greater in the agitator than in the aspirator, as herein shown and described.

We claim as our invention:

1. In an apparatus of the class described, means causing the material under treatment

to assume a hollow completely closed wall formation, and a plurality of devices through and over which the said material is alternately caused to flow and to be maintained at all times during its flow through the apparatus in its hollow completely closed wall formation to agitate the material.

2. In an apparatus of the class described, devices for causing material under treatment to assume a circularly disposed completely closed hollow wall formation, and a plurality of circular alternately arranged deflectors through and over which the material is caused to flow and to maintain its circularly disposed completely closed hollow wall formation throughout its passage through the apparatus to adequately agitate the same.

3. In an apparatus of the class described, devices for causing material under treatment to assume a hollow completely closed wall formation, a plurality of devices over which the material is caused to flow, means for adjusting said devices to position, a plurality of devices intermediate of the aforesaid devices through which the said material is caused to flow, and means for adjusting the said intermediate devices to position, the material being caused to maintain its hollow completely closed wall formation in passing over and through all of the aforesaid devices.

4. An agitator for flour and like material, comprising a casing, means for causing flour to flow to the casing, means for causing the flour upon entering the casing to assume a hollow completely closed wall formation, and a plurality of devices within the casing over and through which the said flour is caused to flow in alternate inward and outward directions and is maintained in its hollow completely closed wall formation in its passage over and through the said devices to thoroughly agitate the flour.

5. An agitator for flour and like material, comprising a casing, a conical deflector adjustable to position adjacent the top of the casing, a deflector universally adjustable laterally to position at the top of the casing and by which the flour is conveyed to the upper surface of the conical deflector for causing the flour to assume the formation of a hollow stream with a completely closed wall, and devices adjustable to position in the casing and through which and over which the flour is caused to pass alternately in opposite directions to agitate the same while maintaining said formation.

6. An agitator for flour and like material, comprising a casing, a conical deflector adjustable to position adjacent the top of the casing, a deflector universally adjustable laterally to position at the top of the casing and by which the flour is conveyed to the upper surface of the conical deflector for causing the flour to assume the formation of a hollow stream with a completely closed wall, a plurality of deflectors associated with the aforesaid conical deflector and adjustable relatively thereto on the surface of which the flour passes in one direction, and a plurality of deflectors intermediate of the aforesaid deflectors adjustable to position and through which the flour is caused to pass in the opposite direction in flowing in the hollow stream and closed wall formation through the casing.

7. An agitator for flour and like material, comprising a casing, an upright mounted centrally of the casing, a conical deflector adjustably mounted at the upper end of the upright, a deflector universally adjustable laterally to position at the top of the casing relatively to the apex of the said conical deflector in order that flour passing through the said deflector to the conical deflector may be distributed evenly thereby and caused to leave the same in the form of a hollow stream with a completely closed wall and devices associated with the aforesaid deflectors whereby the hollow stream with closed wall formation of flour is alternately passed in opposite directions to effect its agitation in the apparatus.

8. An agitator for flour and like material, comprising a casing, an upright mounted centrally of the casing, a conical deflector adjustably mounted at the upper end of the upright, a deflector universally adjustable laterally to position at the top of the casing relatively to the apex of the said conical deflector in order that flour passing through the said deflector to the conical deflector may be distributed evenly thereby and caused to leave the same in the form of a hollow stream with a completely closed wall, a plurality of deflectors also adjustable to position on the said upright and over which the hollow stream of flour is caused to pass in an outward direction relatively to the casing, and a plurality of deflectors adjustably mounted intermediate of the aforesaid deflectors and by which the flour is caused to move in an inward direction relative to the casing in passing through the same.

9. An agitator for flour and like material, comprising a casing, an upright mounted centrally of the casing, a conical deflector adjustably mounted at the upper end of the upright, a deflector universally adjustable laterally to position at the top of the casing relatively to the apex of the said conical deflector in order that flour passing through the said deflector to the conical deflector may be distributed evenly thereby and caused to leave the same in the form of a hollow stream with a completely closed wall, a plurality of deflectors also adjustable to position on the said upright and over which the hollow stream of flour is caused to pass

in an outward direction relatively to the casing, a plurality of rods mounted in the casing adjacent the walls thereof, and a plurality of deflectors adjustably connected to the said rods and placed intermediate of the deflectors mounted on the upright and through which the flour in passing in its hollow stream form is caused to flow in an inward direction relatively to the casing.

10. In an apparatus of the class described, means causing the material under treatment to assume a hollow completely closed wall formation, a plurality of devices through and over which the said material is alternately caused to flow and to be maintained at all times during its flow through the apparatus in its hollow completely closed wall formation to agitate the material, and means for passing a gas into the hollow body of material under treatment.

11. In an apparatus of the class described, devices for causing material under treatment to assume a circularly disposed completely closed hollow wall formation, a plurality of circular alternately arranged deflectors through and over which the material is caused to flow and to maintain its circularly disposed completely closed hollow wall formation throughout its passage through the apparatus to adequately agitate the same, and means for passing a gas into the hollow body of material under treatment.

12. In an apparatus of the class described, devices for causing material under treatment to assume a hollow completely closed wall formation, a plurality of devices over which the material is caused to flow, means for adjusting said devices to position, a plurality of devices intermediate of the aforesaid devices through which the said material is caused to flow, means for adjusting the said intermediate devices to position, the material being caused to maintain its hollow completely closed wall formation in passing over and through all of the aforesaid devices, and means for passing a gas into the hollow body of material under treatment.

13. An agitator for flour and like material, comprising a casing, an upright mounted centrally of the casing, a conical deflector adjustably mounted at the upper end of the upright, a deflector universally adjustable laterally to position at the top of the casing relatively to the apex of the said conical deflector in order that flour passing through the said deflector to the conical deflector may be distributed evenly thereby and caused to leave the same in the form of a hollow stream having a completely closed wall, a plurality of deflectors also adjustable to position on the said upright and over which the hollow stream of flour is caused to pass in an outward direction relatively to the casing, a plurality of deflectors adjustably mounted intermediate of the aforesaid deflectors and by which the flour is caused to move in an inward direction relative to the casing in passing through the same, and pipes passing through casing and terminating in downwardly extending nozzles within the hollow stream of flour.

Signed by us 11th day of February, 1921.

MICHAEL M. FREDEL.
WILLIAM BOSANKO.