May 10, 1932. S. CHASE 1,857,495

DISTRIBUTOR

Filed April 8, 1929 2 Sheets-Sheet 1

Fig. 1.

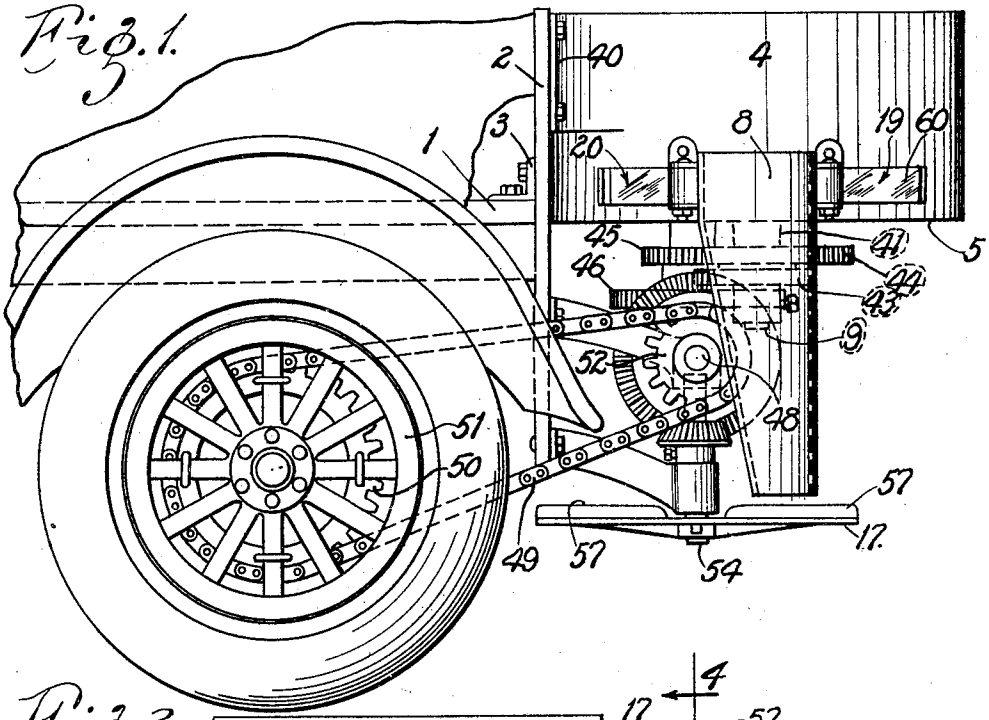
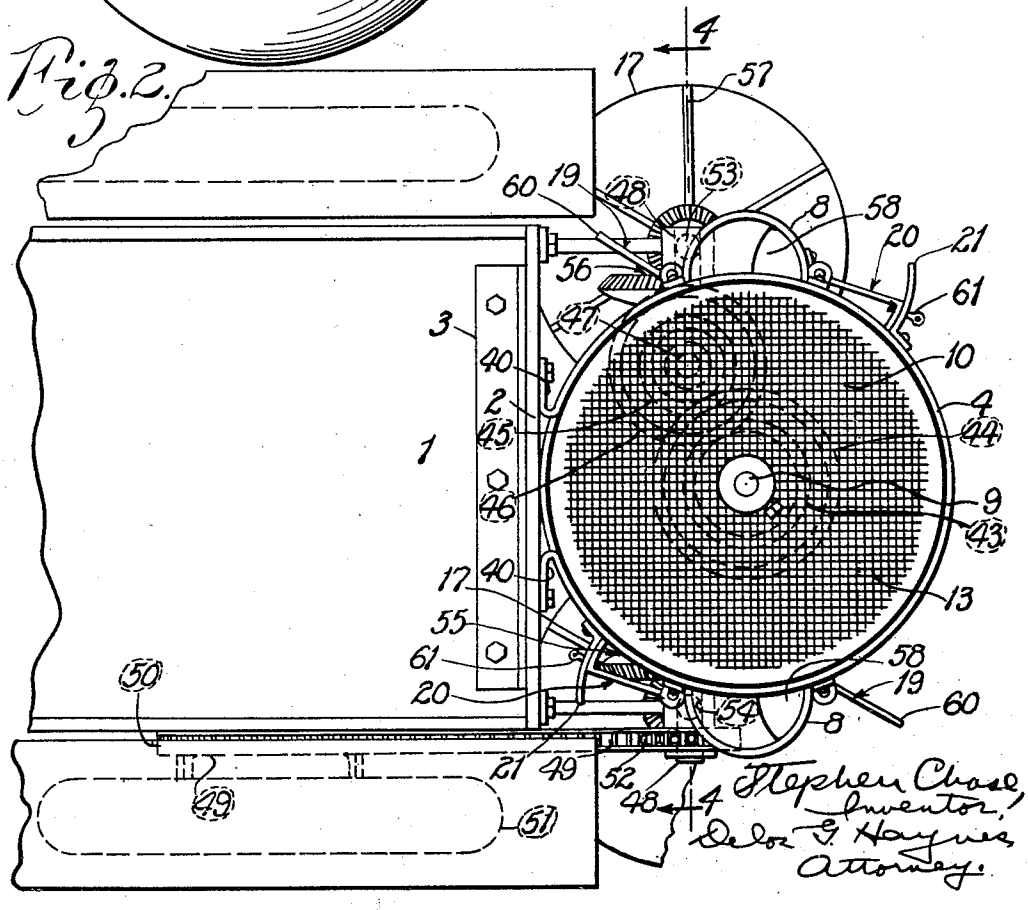


Fig. 2.



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Fig. 3.

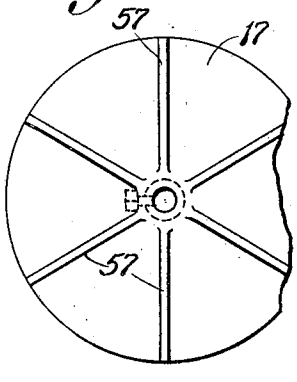


Fig. 6.

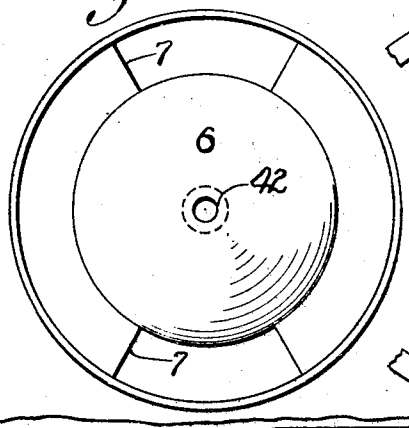


Fig. 7.

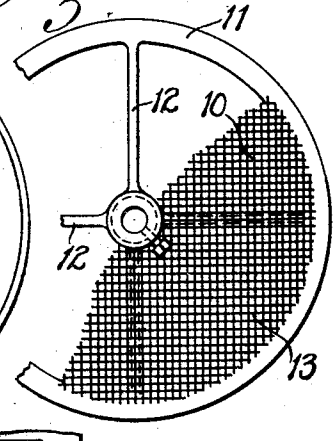
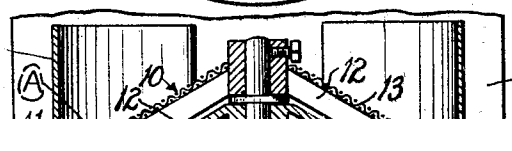


Fig. 4.



Patented May 10, 1932 1,857,495

UNITED STATES PATENT OFFICE

STEPHEN CHASE, OF DUNEDIN, FLORIDA, ASSIGNOR TO STEPHEN CHASE, JR., OF HAMILTON, OHIO

DISTRIBUTOR

Application filed April 8, 1929. Serial No. 353,525.

This invention relates to distributors, and with regard to certain more specific features, to a mechanical distributor for spreading materials such as fertilizer, lime, seeds and the like.

Among the several objects of the invention may be noted the provision of a distributor which evenly distributes material at a rate proportional to the rate of progress of the vehicle on which the distributor is mounted, thereby obtaining a constant amount of deposit per unit of land covered; the provision of a device of the class described in which the rate of distribution is regulable and/or adapted to be quickly started and stopped while the vehicle is in motion and wherein a backing operation or stopping of the vehicle automatically stops distribution; the provision of a device of the class described having an open passage portion wherein the material being distributed is visible for purposes of constant inspection before scattering of the same; the provision of a device of the class described which may have several independently adjustable delivery paths; and the provision of a device of the class described of a pressure delivery type. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structure hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is illustrated one of various possible embodiments of the invention,

Fig. 1 is a side elevation showing the device attached to the rear end of a truck;

Fig. 2 is a plan view of Fig. 1;

Fig. 3 is a plan view of a broadcasting disc;

Fig. 4 is a vertical cross section, taken substantially on line 4—4 of Fig. 2;

Fig. 5 is a horizontal section taken on line 5—5 of Fig. 4;

Fig. 6 is a plan view of a false bottom; and

Fig. 7 is a plan view of an agitator unit.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

Referring now more particularly to Fig. 1, there is illustrated at numeral 1 the bed of a wagon or truck, to the overhanging rear end of which is affixed, by means of a suitable angle iron 3 (or otherwise), a vertical support 2. The support 2 is in the form of a board and extends over substantially the entire width of the bed 1 and has mounted thereon by means of suitable brackets 40 a substantially cylindrical hopper 4. The brackets 40 are cut and bent from the hopper 4, forming an integral part thereof.

The hopper 4 includes a bottom or bearing support 5, above which is mounted a stationary false bottom 6 which, while shown conical in the drawings (Figs. 4 and 6), may be made flat or of other suitable shape consistent with the functions to be set out. It is to be understood that the support 5 is not necessarily a solid disc but may comprise a spoke or spokes, inasmuch as it does not support material as does a supporting disc 14 (to be described). The false bottom 6 is solid, except for two opposite peripheral openings 7 which are positioned at ninety degrees with respect to two oppositely located chutes 8 on and communicating with the hopper 4 (see Figs. 4, 5 and 6). It will be noted that this false bottom 6 is solid, except for the openings 7 located in a predetermined relation with respect to certain regulators and diverters (to be more particularly described); but the primary feature is a cover over the regulators and diverters to confine the material within a tunnel while being measured and diverted to the chutes.

A vertical main shaft 9 passes through the bottoms 5 and 6 by way of suitable bearings 41 and 42 respectively, said shaft 9 being rotatable in said bearings. Mounted on this shaft 9 and rotatable therewith are several elements, comprising first, an agitator 10 (shown in plan in Fig. 7), said agitator 10 comprising an outer ring 11 supported by paddle shaped radial ribs 12 for agitation and scraping purposes, and a screen 13 mounted on the ribs or spider 12 for movement therewith and for the purpose of sifting

fertilizer or the like which is positioned in the hopper 4.

Second, there is mounted on said shaft 9 and between the bottoms 5 and 6, a rotatable material supporting disc or member 14 having an upwardly projecting cylindrical rib 15 which is concentric with shaft 9 and of sufficient height to slidably engage the false bottom above. It will be seen hereinafter that the rib 15 may be positioned at angles other than ninety degrees with respect to the member 14. For instance, it may be located in the alternate position indicated by dotted lines A in Fig. 4. In any instance, it is preferable that the rib be sufficiently deep that the distance between the rotatable support, and the false bottom, be equal to or greater than the radial width of said opening 7.

Third, below the bottom 5 there is provided on the shaft 9 an integrally rotatable nest of gears 43 and 44 which are adapted to be shifted lengthwise of the shaft 9 so that the gear 44 of the nest may be made to mesh with a gear 45 of another integrally rotatable nest of gears, or the gear 43 may mesh with gear 46 of said last-named nest. By this means the gear or velocity ratio between the shaft 9 and its driving shaft 47, and thus its ratio to ground travel correspondingly, may be changed at any time conditions may require.

The nest of gears 45, 46 are mounted on the counter shaft 47 which is geared to a jack shaft 48 by way of a set of bevel gears 49. It will be seen from Fig. 1 that the jack shaft is supported from the rear end of the bed 1 and is driven by way of a sprocket 52 and chain 49 from a sprocket 50 mounted so as to be movable with one of the rear wheels 51 of the truck or wagon and the ratio of revolutions of the shaft 9 to the ground travel may be further changed by a change in the ratio of sprockets 50 and 52. The chain drive comprises a mechanical connection between the wheel 51 and the main shaft 9. Hence it will be seen that the rate of rotation of the jack shaft 48 is proportional to the angular movement of wheel 51 which in turn is proportional to the movement of the vehicle.

As indicated in Fig. 4, the jack shaft 48 is geared with two vertical shafts 53 and 54 by way of bevel gear sets 55 and 56 respectively. It is to be understood that the various shafts herein described are suitably mounted in bearings associated either with the stationary hopper 4 and/or the support 2.

At the lower ends of the shafts 53 and 54 are fastened rotatable broadcasting discs 17 on the upper surfaces of which are affixed radial fins 57 (see Figs. 3 and 4). From Fig. 4 it will be seen that the said chutes 8 extend downwardly to points in juxtaposition above the broadcasting discs 17. The chutes 8 are positioned sidewardly on the hopper 4 and communicate therewith by means of ports 58 illustrated in Fig. 4. From the above it will be seen that any fertilizer or the like which descends within the chutes 8 falls upon the rotating broadcasting discs and is thrown off centrifugally and thereby is spread.

Referring to Fig. 5, it will be seen that there is provided a pair of diverters 19 which are pivoted outside of the hopper 4 and by way of extensions 59 pass through small openings 62 into the hopper. These diverters may be rotated by means of outward extensions 60 so as to open and close the passages 58 to the chutes 8. When open, these diverters direct whatever material has been allowed to pass by regulators to be described, which material is on the face of the material carrying disc 14, thence the material passes through the ports and into the chutes. This is because the diverters completely close the space or tunnel between the false bottom, the horizontal face of the material carrying disc and the internal rib 15. It will be seen however that the diverters will only be open upon counter-clockwise rotation of the disc 14 and that if said disc 14 is rotated in the reverse direction that the material on the edge thereof will automatically close the diverters so that no material is allowed to pass through the ports but is allowed to pass uninterruptedly in reverse direction through the tunnel. It will be noted that the diverters are on the receding sides of the chutes 8.

It is understood that the counter-clockwise movement for delivery is only a matter of design and that by changing the position of the gears the machine may be constructed to revolve in a clockwise direction. Under such conditions the relative positions of the diverters and regulators will also be reversed.

On the approach sides of the chutes 8 are provided pivoted gate valves or regulators 20 which slide into and out of the hopper 4 and between the two members 6 and 14 at their edges. They may be adjusted to increase or decrease the openings through which the fertilizer must pass in order to get to the chutes. These regulators 20 which slide into and out of the hopper 4, virtually filling the vertical distance between members 6 and 14, are held in position by cotter pins 61 which pass through any one of a number of openings formed through an arcuate shaped piece 21 attached to the hopper 4. It is apparent that by providing a holding means for the diverters 19, that they also may be used for regulating the quantity of fertilizer passing to the chutes, that is, by predeterminately positioning them angularly. Alternate dotted line positions show the closed positions of the diverters 19 and regulators 20 in Fig. 5.

It is to be understood that the outlines of the diverters and regulators are substantially that of the space or tunnel between the disc 14, false bottom 6 and rib 15. If the rib is

angularly positioned or has an odd shape other than the shapes described, then the ends of the diverters and regulators should conform thereto.

The operation of the device is as follows:

A charge of fertilizer is carried in the hopper 4 which is replenished from time to time from a main supply on the bed of the wagon or truck. As the truck moves forwardly, the wheel 51 rotates at a proportionate rate of speed and rotates the sprocket 50 so that the sprocket 52 on the jack shaft 48 is rotated proportionately by way of the chain 49. This results in proportionate rotation of the vertical feed shaft 9 and the two shafts 53 and 54 associated with the broadcasting discs 17.

The material in the hopper 4 falls through the rotating screen 13 and spider 12. As it sifts down on to the false bottom 6 it is forced by the scrapers around into the openings 7, from whence it drops to the rotating disc 14 and into the open tunnel formed by the side of the hopper 4, the upper face of disc 14 and the rib 15 and is thus positioned peripherally on the rotating disc 14.

Forward movement of the vehicle is adapted to effect counter-clockwise rotation of the disc 14 and associated parts, as will be apparent by tracing action of the gear train in the drawings. This counter-clockwise movement causes the material to get in behind the diverters 19 and push them to their full open position so that the material is diverted through the openings 58 and into the chutes 8, from whence it descends down on to the broadcasting discs to be projected centrifugally to the ground. It is to be understood that the regulators 20 may be set at any optimum position for effecting passage of any predetermined amount of material. The counter-clockwise movement causes the material, through the frictional action of disc 14 and rib 15 to be carried under the solid portion of the false bottom 6 and thus is confined and is under pressure as it reaches the opening between regulator 59 and rib 15. After passing through this pre-regulated opening it gets behind the diverters as described above. It is to be understood that springs may be provided to insure complete contact of diverter with rib 15.

As illustrated in Fig. 4, the upper ends of the chutes 8 are open so that the amount and grade of material passing down the same may be examined at all times. By this means a close check may be kept upon the satisfactory operation of the machine by the man who fills the hopper.

As can be seen from the drawings, the angular velocities of the broadcasting discs are considerably higher than the angular velocity of the delivery disc 14 and associated parts (note the relative gear diameters).

When the truck or the like is reversed in direction of movement, the disc 14 and all other parts reverse in direction of movement. The direct consequence is that any material which is then at the periphery of disc 14 will close the diverters or deflectors 19 so that no spreading action is effected. It will be seen that under normal conditions of operation, that is, when the disc 14 is moving counter-clockwise (Fig. 5), that the effect of the friction between disc 14 and rib 15, and the material in the tunnel is to fill the tunnel space between the support 14, false bottom 6 and rib 15, so that there is provided in effect a substantially constant pressure feed of material into the chutes 8. It is to be understood that the openings 7 are sufficiently large, and/or the tunnel size sufficiently small, to provide, during counter-clockwise rotation of said support, for the filling with material from the openings 7, of those portions of the tunnel between each opening 7 and its respective delivery chute 8. In other words, the diverters 19 and/or regulators 20 are effective as throttles and the frictional action of the disc 14 and rib 15 maintains material piled up against them at all times. Hence compensation is provided for any irregular sifting action through the screen 13 due to irregular feeding of the machine by its operator.

It is to be understood that although I have shown a construction wherein two chutes and associated broadcasting discs are used, that nevertheless a greater plurality or only one set of these may be used. The chute or chutes may also be placed in a position other than shown. In any event, it is preferable that the opening or openings 7 in the false bottom 6 be arranged in staggered relationship with respect to the chute or chutes 8 and attendant diverters and regulators. The purpose of this is to provide uninterruptedly the improved pressure action. It will not be interfered with by material coming in over said diverters and regulators.

It will be clear that the connections between the main shaft 9 and the members carried thereby may be made by set screws, keying, crown coupling, socketing or otherwise.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A distributor comprising a hopper, at least one sideward chute on the hopper and communicating therewith, a rotating material support therein, a false bottom for the hopper located above said material support

so as to form a peripheral tunnel having moving bottom and inner walls, means for delivering material into said tunnel to move therein, at least one diverter within the tunnel on the receding side of the chute for diverting material thereto, the relation between the dimension of said tunnel and said delivery means being such as to substantially fill, with said material, that portion of the tunnel between said delivery means and said diverter.

2. A distributor comprising a hopper, at least one sideward chute on the hopper and communicating therewith, a rotating material support therein having a bottom and an inner wall, a false bottom for the hopper located above said material support so as to form a peripheral tunnel having moving bottom and inner walls, means for delivering material into said tunnel to move therein, at least one diverter within the tunnel on the receding side of the chute for diverting material thereto, the relation between the dimensions of said tunnel and delivery means being such as to substantially fill with said material that portion of said tunnel between said delivery means and said diverter and at least one regulator adapted to be adjustably positioned in the tunnel for controlling passage of material.

3. A distributor comprising a hopper, at least one sideward chute on the hopper and communicating therewith, a rotating material support therein having a rib formed thereon, a false bottom for the hopper located above said material support, said support, hopper and bottom forming peripheral tunnel having moving bottom and inner walls, at least one opening through the false bottom placed in staggered relationship with respect to said chute and leading to said tunnel, the annular area of said tunnel being greater than the area of said opening.

4. A distributor comprising a hopper, at least one sideward chute on the hopper and communicating therewith, a rotating material support therein having a rib formed thereon, a false bottom for the hopper located above said material support, said support, hopper and bottom forming a peripheral tunnel having moving bottom and side walls, at least one opening through the false bottom placed in staggered relationship with respect to said chute and opening into said tunnel, the annular area of said tunnel being greater than the area of said opening, a sifter above the bottom movable with said material support and at least one pivoted diverter adapted to extend over the tunnel to divert material to the chute.

5. A distributor comprising a hopper, at least one sideward chute on the hopper and communicating therewith, a rotating material support therein, a false bottom for the hopper located above said material support, at least one opening leading through the false bottom placed in staggered relationship with respect to said chute, a sifter above the bottom movable with said material support and at least one pivoted diverter adapted to extend over the material support and below the false bottom so as to divert material to the chute when the material support moves in one direction but not when it moves in the reverse direction and at least one regulator extending over the material support and below the false bottom, said diverter being on the receiving side of the chute and the regulator on the approach side thereof so that the regulator controls the amount of material which is diverted into the chute by the diverter.

6. A distributor comprising a hopper, at least one sideward chute on the hopper and communicating therewith, a rotating material support therein, a false bottom for the hopper located above said material support, at least one opening leading through the false bottom placed in staggered relationship with respect to said chute, a sifter above the bottom movable with said material support and at least one pivoted diverter adapted to extend over the material support and below the false bottom so as to divert material to the chute when the material support moves in one direction but not when it moves in the reverse direction and at least one regulator extending over the material support and below the false bottom, said diverter being on the receiving side of the chute and the regulator on the approach side thereof so that the regulator controls the amount of material which is diverted into the chute by the diverter and a rib on the material support for confining the material to a substantially peripheral position thereon.

7. A distributor comprising a hopper, at least one sideward chute on the hopper and communicating therewith, a rotating material support therein having a rib formed thereon, a false bottom for the hopper located above said material support, said hopper, bottom and support forming a peripheral tunnel having moving bottom and inner walls, at least one opening through the false bottom placed in staggered relationship with respect to said chute and opening into said tunnel, said rotating tunnel being adapted to deliver material from said hopper to said chute at a substantially constant material feed pressure.

8. A distributor comprising a hopper, at least one sideward chute on the hopper and communicating therewith, a rotating material support therein, a false bottom for the hopper located above said material support and a rib on the material support below the false bottom arranged so as to form a peripheral tunnel having a moving bottom an opening in said bottom leading into said tunnel,

the dimensional relationship between the annular area of said tunnel, and the area of said opening being such that the pressure of the material in said tunnel is independent of the gravitational pressure of the material in said hopper.

9. A distributor comprising a hopper, at least one sideward chute on the hopper and communicating therewith, a rotating material support therein having a circumferential rib formed thereon, a false bottom for the hopper located above said material support said hopper, rib, support and bottom forming a peripheral tunnel having moving bottom and inner walls, and at least one diverter adapted to extend into said tunnel to divert material therefrom to said chute, said tunnel being adapted to deliver material to said chute at a substantially constant pressure for a given speed of rotation of said support.

10. A distributor comprising a hopper, a rotating material support therein having a rib formed thereon, a false bottom for the hopper located above said material support, said hopper, rib and bottom forming a peripheral tunnel having moving bottom and inner walls, at least one opening leading through the periphery of the false bottom and to said tunnel an outlet from the hopper communicating with said tunnel, and the dimensional relationship between said tunnel and opening being such that the frictional pressure of said material at said outlet is substantially independent of the gravitational pressure of the material in said hopper at said opening.

11. A distributor comprising a hopper, a rotating material support therein having a rib formed thereon, a false bottom for the hopper located above said material support, said hopper, rib, and bottom forming a peripheral tunnel having moving bottom and inner walls, at least one opening through the periphery of the false bottom and leading into said tunnel, an outlet from the hopper communicating with said tunnel, and the dimensional relationship between said tunnel and opening being such that the frictional pressure of said material at said outlet is substantially constant at a given angular velocity of said support, and at least one regulator in said tunnel adapted to control the flow of material to said outlet.

12. A distributor comprising a hopper, a rotating material support therein having a rib formed thereon, a false bottom for the hopper located above said material support, said hopper, rib and bottom forming a peripheral tunnel having moving bottom and inner walls, at least one opening in the periphery of the false bottom leading into said tunnel, an outlet from the hopper communicating with said tunnel, said tunnel being adapted to deliver material from said hopper to said outlet by means of the substantially constant frictional pressure of said material established at said outlet.

13. A distributor comprising a hopper, a rotating material support therein having a rib formed thereon, a false bottom for the hopper located above said material support, said hopper, rib, and bottom forming a peripheral tunnel having moving bottom and inner walls, at least one opening in the periphery of the false bottom leading to said tunnel, an outlet from the hopper communicating with said tunnel, and the dimensional relationship between said tunnel and opening being such that the frictional pressure of said material at said outlet is substantially constant, at least one regulator in said tunnel adapted to control the flow of material to said outlet, and at least one diverter, operable by movement of the material, and extending into said tunnel so as to deliver material to said outlet.

14. A distributor comprising a hopper, at least one sideward chute on the hopper and communicating therewith, a rotating means in said hopper for delivering material under frictional pressure to said chute, a false bottom for said hopper located above said rotating means, and having at least one opening therethrough and into said rotating means, said opening being in staggered relationship to said chute, whereby said material in said hopper flows through said opening into said rotational means and is delivered under constant frictional pressure to said chute, and at least one regulating means positioned in said rotational means for regulating the flow of material to said chute.

15. A distributor comprising a hopper, at least one sideward chute on the hopper, and communicating therewith, a rotating means, having a rib formed thereon located in said hopper, a false bottom in said hopper located above said rotating means and having at least one peripheral opening therein, opening into said rotational means, said hopper, rib, rotational means, and bottom forming a peripheral rotating tunnel having a moving bottom and a moving inner wall, said tunnel being adapted to effect a continuous, uninterrupted material pressure established by the frictional contact of the walls and material, at said chute.

16. A distributor comprising a hopper, at least one sideward chute on the hopper and communicating therewith, a stationary, upright, conically shaped false bottom in said hopper, a bearing in the vertex thereof, a revolving shaft in said bearing, a conically shaped sifter mounted on said shaft, and above said false bottom, said sifter revolving with said shaft, and rotating means beneath said false bottom for delivering material, fed thereto from said false bottom, at a substantially constant frictional pressure to said chute.

17. A distributor comprising a hopper, at least one sideward chute on the hopper and communicating therewith, a stationary, upright, conically shaped false bottom, in said hopper, a bearing in the vertex thereof, a revolving shaft mounted in said bearing, a conically shaped sifter mounted on said shaft, and above said false bottom, said sifter revolving with said shaft, and rotating means beneath said false bottom for delivering material, fed thereto from said false bottom, at a substantially constant frictional pressure to said chute, at least one regulator in said rotational means for regulating the flow of material to said chute without interfering with the rotation of said rotational means and at least one diverter in said rotational means diverting the material, fed thereto, into said chute, said regulator and diverter being adapted to be regulated.

In testimony whereof I have signed my name to this specification this 26th day of March, 1929.

STEPHEN CHASE.