Dec. 22, 1925. 1,566,746

C. R. HERMAN

FEEDING AGITATOR

Original Filed May 21, 1924 2 Sheets-Sheet 1

FIG. 1.

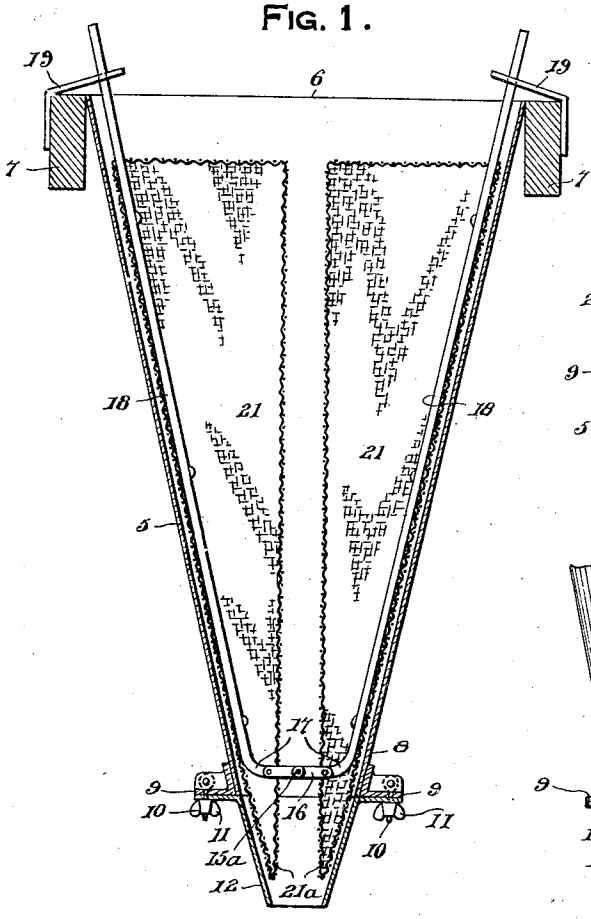


FIG. 4.

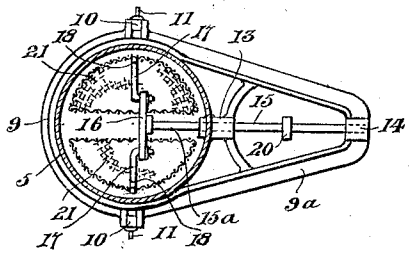


FIG. 3.

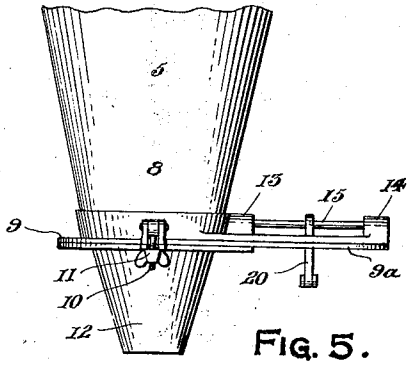


FIG. 2.

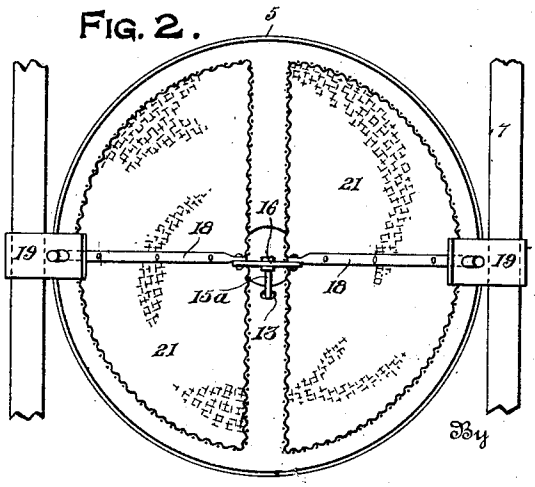
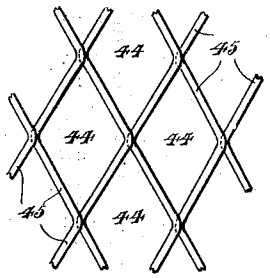


FIG. 5.



Inventor

Carl R. Herman

Bryant & Lowry.

Attorneys.

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FIG. 6.

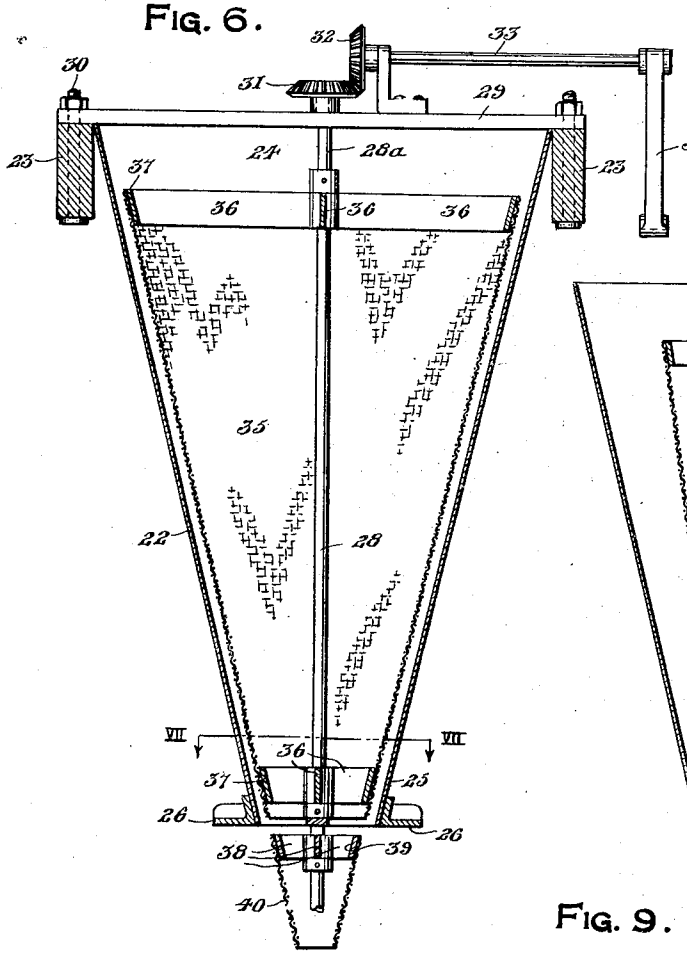


FIG. 8.

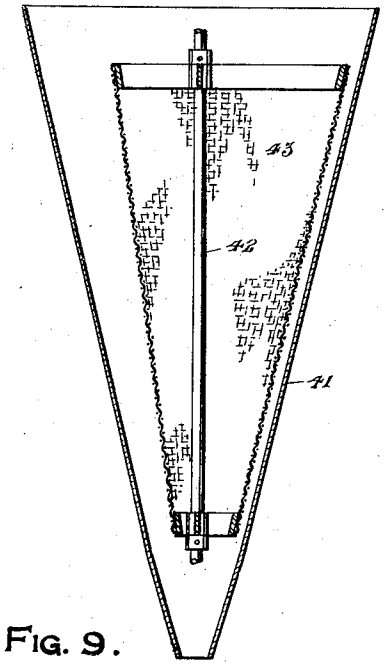


FIG. 9.

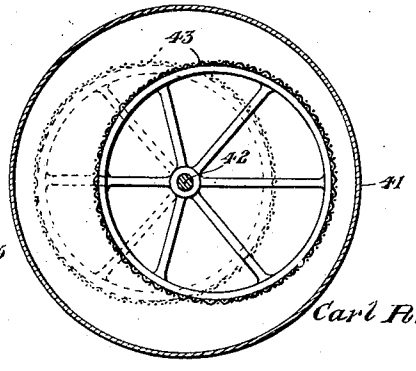
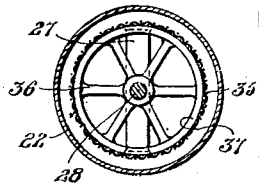


FIG. 7.



Inventor
Carl R. Herman

By Bryant & Lowry
Attorneys

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UNITED STATES PATENT OFFICE.

CARL R. HERMAN, OF CRAFTON, PENNSYLVANIA, ASSIGNOR TO JAMES F. COOK, OF CRAFTON, PENNSYLVANIA.

FEEDING AGITATOR.

Application filed May 21, 1924, Serial No. 714,855. Renewed November 12, 1925.

To all whom it may concern:

Be it known that I, CARL R. HERMAN, a citizen of the United States of America, residing at Crafton, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Feeding Agitators, of which the following is a specification.

This invention relates to improvements in feeding agitators.

An important object of this invention is to provide means for agitating material, preferably of granular form, positioned within a receptacle for causing the material to freely flow through a discharge orifice in said receptacle.

A further object of the invention is to provide a device which is particularly adapted for agitating material in the neighborhood of the walls of a receptacle whereby all arching of the material will be prevented.

A still further object of the invention is to provide agitating elements of new and improved construction which are especially adapted for maintaining particles of a mass in a disconnected state.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a longitudinal, vertical section of one form of agitator embodying this invention,

Figure 2 is a top plan view of the agitator illustrated in Fig. 1,

Figure 3 is a fragmentary elevational view of a portion of the receptacle within which this form of agitator operates and further illustrates a portion of the connection between the agitator and the source of power employed for driving the same,

Figure 4 is a transverse sectional view of Fig. 3, the drive connection being shown in top plan,

Figure 5 is an enlarged view of a fragmentary portion of a particular type of article employed for forming the portions of the agitator which operate directly upon the material to be influenced by the same,

Figure 6 is a longitudinal vertical sectional view of a modified form of agitator embodying this invention,

Figure 7 is a transverse sectional view taken upon lines VII—VII of Fig. 6,

Figure 8 is a longitudinal vertical sectional view of a still further modification embodying this invention, and

Figure 9 is a transverse sectional view of the agitator illustrated in Fig. 8.

Referring to the accompanying drawings and particularly to Figs. 1 to 4 inclusive, the numeral 5 designates the body portion of a receptacle which in this particular instance is in the form of a hopper of conical shape adapted to receive granular material which is placed therein through its larger, open end 6. Any suitable form of means may be employed for supporting this body portion 5 and such means, in this showing, consists of beams 7 to which the larger end of the body portion 5 is attached in such a manner that the said body portion will depend from the beams. The lower, smaller end 8 of this body portion is preferably provided with a laterally extending flange 9 which may entirely encircle the same or it may be formed, as best illustrated in Figs. 3 and 4, with a laterally projecting, U-shaped extension 9^a.

This flange 9 is intended to be provided with suitable means, such as the swinging bolts 10 and wing nuts 11 for clamping a removable nozzle 12 to the end 8 of the body portion 5 of the hopper. This nozzle is intended to represent a removable unit which is provided with suitable valves for controlling the discharge of material from the hopper, but due to the fact that such a discharge control does not form a portion of this invention, the valve or valves are not shown.

In Figs. 3 and 4, there are shown a pair of axially alined bearings 13 and 14 which are carried respectively by the wall of the end 8 of the hopper and the extreme outer portion of the U-shaped extension 9^a. Rotatably carried by these bearings 13 and 14 is a shaft 15 which projects into the interior of the body portion 5, at its inner end, and terminates slightly short of the axis of the hopper. Suitably secured to this inner end 15^a of the shaft 15 is a cross link 16 to the

outer ends of which are pivotally connected the lower arcuate ends 17 of rods 18 which extend upwardly through the body portion 5 of the hopper and project outwardly of the upper open end 6 of the same. For the purpose of guiding these projecting ends of the rods 18, suitable bearings 19 are secured to the beams 7, the bearings 19 being constructed to permit longitudinal movement of the rods 18 therethrough.

Suitably, rigidly connected to the portion of the shaft 15 extending between the bearings 13 and 14 is an arm 20 which is connected, by any suitable means, to a power plant or mechanism which will cause partial rotation of the shaft 15, alternately in opposite directions for the purpose of creating what might be more properly termed a rock shaft 15 and for causing the cross link 16 to oscillate the rods 18 in opposite directions.

In Figs. 1, 2 and 4, the rods 18 are illustrated as having secured thereto material agitating elements 21 which are of identical form and each consists of a semi-conical screen. It is to be understood that each screen may be strengthened at its marginal edges or any other places, in any suitable manner for causing the same to maintain the desired formation, as best illustrated in Figs. 1 and 2. It will be noted that the smaller ends of these semi-conical screens 21 project into the nozzle 12 and terminate in close proximity, as at 21^a, to the discharge orifice of this nozzle.

In Figs. 6 and 7, there is shown a modified form of agitator which includes the body portion 22 of a hopper which is preferably of conical shape and is suitably connected to the beams 23 at its upper end 24. The lower end 25 of this hopper is provided with a suitable flange 26 by means of which a nozzle, not shown, may be attached to the body portion 22.

Extending diametrically through the lower end 25 of the hopper is a brace 27 which is provided with a suitable bearing for rotatably supporting the axially extending shaft 28 which is journaled in proximity to its upper end 28^a in a cross brace 29 that is suitably secured, as by the bolts 30, to the beams 23. A suitable bevel gear 31 is keyed to the extreme end of this shaft 28 and is in mesh with a second bevel gear 32 which is carried by a horizontally extending shaft 33. Suitable means, as designated in general by the numeral 34, is connected to this shaft 33 for conveying motion to the latter which motion may be a continuous rotation in either direction or a partial rotation in opposite directions. Suitably mounted upon the portion of the shaft 28 extending between the elements 27 and 29 is a conical screen 35 which is of slightly less diameter than the diameter of the body portion 22 of the hopper. It is to be understood that any suitable form of connection may be provided for mounting this conical screen 35 upon the shaft 28, however, the preferred form of connection consists of the radial arms 36 which carry the rings 37 that are positioned at opposite ends of the said screen and have the latter suitably attached thereto.

It will be noted that the lower end of the shaft 28 depends below the lower end 25 of the hopper and has mounted thereupon radial arms 38 which carry a ring 39. This ring has secured thereto a relatively small, conically-shaped screen 40 which will reside within the nozzle, not shown, that is to be attached to the body portion 22 by any suitable means, such as that illustrated in connection with the nozzle 12 disclosed in Fig. 1.

In Figs. 8 and 9, there is illustrated a still further modified form of agitator which includes a hopper 41 which is intended to be of similar formation to the hopper 5 illustrated in Fig. 1. Rotatably mounted within this hopper, by any suitable means not shown, is a shaft 42 which has eccentrically mounted thereon a conical screen 43 which is reduced in diameter a sufficient extent to cause the portion of the wall of the same positioned the greatest distance from the shaft 42 to always reside a short distance from the inner face of the wall of the hopper 41. In Fig. 9, this agitator screen is illustrated in full lines in one position and in dotted lines in a second position, the dotted line position representing the agitator after the shaft 42 has been rotated 180°.

In Fig. 5 there is illustrated a portion of the type of article to be used for forming the screens 21, 35 and 43 illustrated in the various other figures. This article or screen is intended to be of the expanded metal type, that is, the type of screen formed by cutting spaced slits in a sheet of metal and expanding the metal to form the openings 44 between the various strands 45. This type of screen has proved, by experiment, to be very practical in view of the fact that each strand 45 is of substantially rectangular or square formation is cross-section and provides at least four relatively sharp edges. These sharp edges provide excellent means for maintaining the particles of a mass of granular material in a disconnected state.

The result obtained by these various forms of agitators are substantially identical for they all provide means for agitating material in the neighborhood of the walls of a hopper for the purpose of preventing all arching of material within the latter. It is well known by those skilled in the art that material first starts to arch in the vicinity of the walls of a hopper and this arching continues inwardly until a complete wall is

formed across the bore of the hopper whereupon the material will cease to flow. This arching cannot occur if the material is prevented from clinging to the walls of the hopper and for this reason the three forms of agitators illustrated herein are believed to be extremely efficient in view of the fact that they operate directly upon the material in the neighborhood of the walls of the hopper.

It has been previously stated that the semi-conical screens 21 illustrated in Figs. 1, 2 and 4 oscillate in opposite directions while the conical screen 35, illustrated in Figs. 6 and 7 may be operated for completely rotating in either direction or for partially rotating in opposite directions. The shaft 42, illustrated in Figs. 8 and 9, may be completely rotated in either direction or partially rotated in opposite directions, as described in connection with the shaft 28 in Figs. 6 and 7. It will be clearly seen, by inspecting Fig. 9, that this eccentrically mounted screen 43 will operate throughout a larger zone than will the concentrically mounted screen 35, illustrated in Figs. 6 and 7. The zone of operation of the eccentrically mounted screen 43 will be of annular shape in cross-section and will have a width equal to the distance between the wall of the agitator shown in full lines and the wall as shown in dotted lines.

It is now believed that the construction and operation of the various forms of invention will be clearly understood and that the forms herewith shown and described are to be taken as preferred examples of the same, while various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described the invention, I claim:—

1. In a device of the type described, the combination with an imperforate conical hopper, of perforated agitating means within said hopper for maintaining material in proximity to all the wall surface of the latter in a state of unrest, and means for operating said agitating means.

2. In a device of the type described, the combination with an imperforate conical hopper, of agitating means within said hopper limited in its operation to the material in proximity to all the wall surface of the hopper for preventing the arching of material within the latter, and means for operating said agitating means.

3. In a device of the type described, the combination with a conical hopper having a detachable discharge nozzle, of agitating means within said hopper and nozzle and conforming in cross-sectional shape with the shape of said hopper and nozzle for maintaining material in proximity to all of the wall surface of the latter in a state of unrest, and means for operating said agitating means.

4. In a device of the type described, the combination with a conical hopper having a discharge nozzle of conical shape, of perforated agitating means within said hopper and nozzle conforming in cross-sectional shape with the shape of said hopper and nozzle for preventing the arching of material therewithin, and means for operating said agitating means.

5. In a device of the type described, the combination with an imperforate conical hopper, of hollow agitating means extending longitudinally through said hopper for maintaining material in proximity to all of the inner wall surface of the latter in a state of unrest, and means for operating said agitating means.

6. In a device of the type described, the combination with an imperforate conical hopper, of an agitator conforming in cross-sectional shape with the shape of said hopper positioned within the latter, said agitator comprising supporting means and a screen attached thereto, and means for operating said agitator.

7. In a device of the type described, the combination with a hopper, of an agitator positioned within said hopper, said agitator comprising supporting means and a screen formed of expanded metal attached thereto, and means for operating said agitator.

8. In a device of the type described, the combination with a hopper, of a perforated sectional agitator within said hopper limited in its operation to the material in proximity to all the wall surface of the latter to maintain said material in a state of unrest, and means for operating said agitator.

9. In a device of the type described, the combination with a conical hopper, of a pair of semi-conical elements mounted within said hopper in proximity to the inner face of the same, and means for agitating said elements.

10. In a device of the type described, the combination with a conical hopper, of a pair of semi-conical elements formed of screening material mounted within said hopper, and means for agitating said elements.

11. In a device of the type described, the combination with a conical hopper, of a pair of semi-conical elements formed of expanded metal screening mounted within said hopper, and means for agitating said elements.

12. In a device of the type described, the combination with a conical hopper, of a pair of semi-conical agitator screens mounted within said hopper, and means for connecting and actuating said screens.

13. In a device of the type described, the combination with a conical hopper, of a pair of semi-conical agitator screens mounted in

said hopper, and means for causing said screens to oscillate in opposite directions.

14. In a device of the type described, the combination with a hopper, of a plurality of perforated elements mounted in said hopper, and means for agitating said elements.

15. In a device of the type described, the combination with a hopper, of a plurality of perforated semi-conical elements mounted in said hopper, and means for agitating said elements.

16. In a device of the type described, the combination with a hopper, of a plurality of perforated semi-conical elements mounted in said hopper, and means for longitudinally agitating said elements.

17. In a device of the type described, the combination with a hopper, of a plurality of perforated elements mounted in said hopper, and means for longitudinally agitating said elements in opposite directions.

In testimony whereof I affix my signature.

CARL R. HERMAN.