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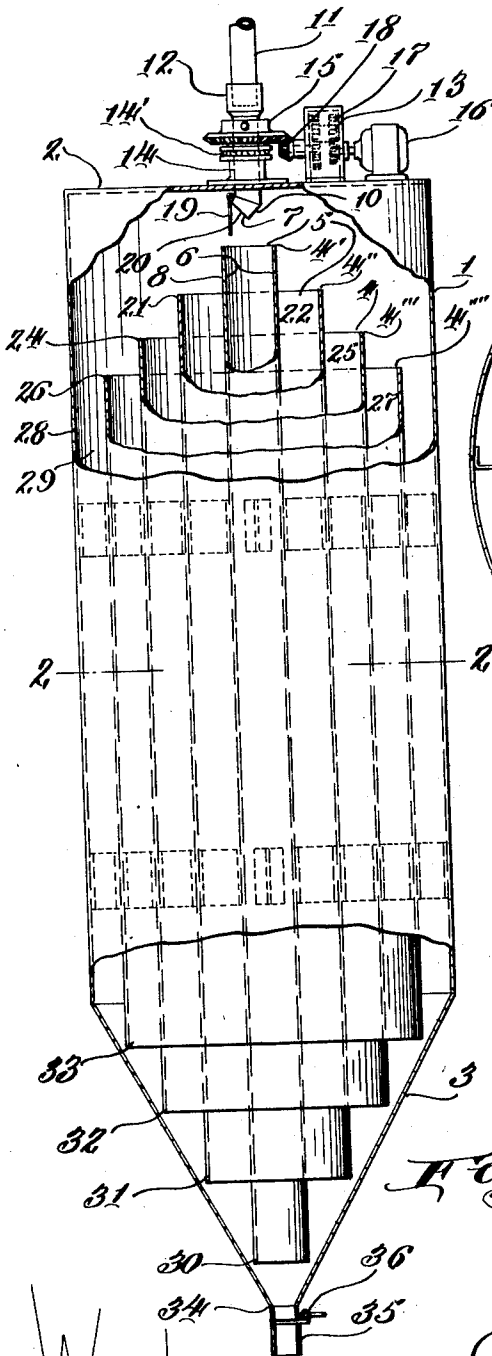


Fig. 1.

Fig. 2.

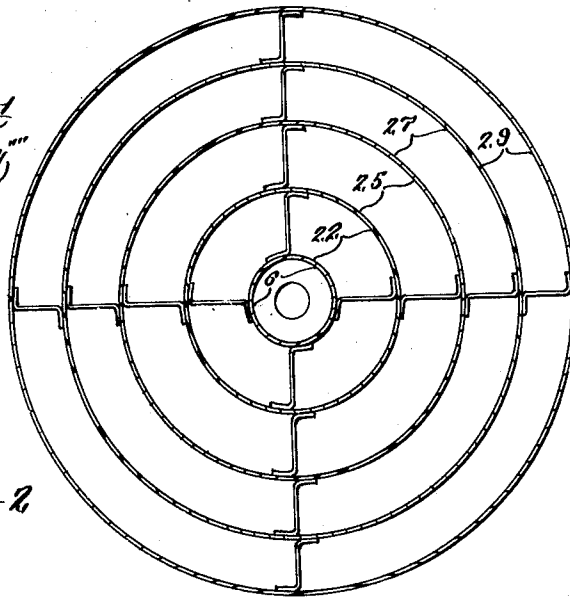
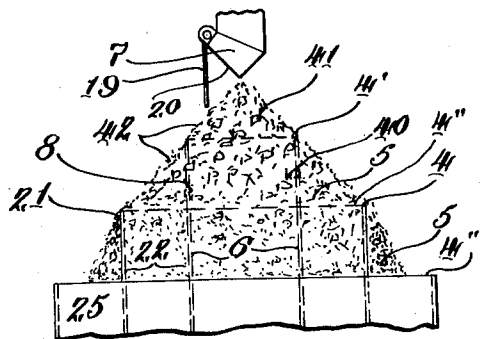


Fig. 3.

WITNESSES

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STORAGE BIN

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3 Claims. (Cl. 214—16)

In the delivery of comminuted materials composed of a mixture of fine and coarse particles, there is a tendency to separate the coarse from the fine particles thereby segregating the coarse particles in one part of the mass of material and the fine particles in another part. For example, when the comminuted material is deposited on a floor or in a bin by means of a chute, a spout or nozzle, or other directing means, it forms in a heap or pile of material the inclined sides of which pile or heap, which assumes an angle with the vertical known as the angle of repose of the material, serve as a more or less crude mechanical separator due to the tendency of the larger particles to roll down the incline, while the smaller or lighter particles having a less tendency to roll, accumulate at the center or top of the heap directly beneath the source from which the material is being poured or dropped.

This segregation of the fine or light and coarse or heavy particles is, in many instances, undesirable, particularly when the commodity being handled consists of a predetermined mixture of particles of different materials of different sizes or of different specific gravity. This is the case with various fertilizer mixtures, and also with different prepared feeds as the poultry feed known as scratch, which consists of various grains and other materials mixed in predetermined and definite proportions.

The object of the present invention is to produce a storage hopper or bin adapted to contain and store such comminuted materials and to deliver them in the desired quantities without segregation of the coarse and fine or light and heavy particles.

The apparatus of the invention is devised to limit and in fact to practically prevent the separation or segregation of the finer or lighter and heavier or coarser particles by rolling or sliding of the particles at different velocities and for different distances.

This result is effected by means of a series of baffles which are spaced apart at relatively narrow intervals preventing or limiting the sliding or rolling of the material in lateral directions so that the material delivered in any of a series of successive periods corresponding to the volumes enclosed by the baffle plates, is deposited in a corresponding space or compartment of limited horizontal area. These compartments in the preferred form of the invention extend substantially the full height of the bin, the baffles being parallel and arranged in a series with the edges at horizontal and successively lower levels so that

as each compartment is filled the material overflows corresponding with the next compartment, so that the respective compartments each contain the material delivered to the hopper during the corresponding interval.

In the operation of the preferred device the material as delivered is directed into or toward the first, which in this instance is the center compartment, and when this is filled it overflows the baffles successively so that as each compartment is filled, the material being delivered passes to the next one, which is filled in turn, the rolling, flowing or sliding of the material down the incline presented by the surface of the material as it is deposited and formed into a pile or heap being thus so restricted and equalized as to the particles of different sizes and weights as to prevent separation in accordance with the varying properties of the particles which are thus stored in a series of compartments or chambers from which they are later delivered simultaneously or otherwise without opportunity for separation of the particles of different sizes as described.

In the preferred form of the invention the delivery from the various compartments or chambers of the material thus stored takes place simultaneously, though this may be regarded as not essential to the invention in its broader scope.

In the accompanying drawing I have illustrated a storage bin embodying the features of the invention in the preferred form.

In the drawing:

Figure 1 is an elevation of the bin, certain portions being broken away to illustrate the internal construction.

Figure 2 is a horizontal section on the line 2, 2 of Figure 1.

Figure 3 is a fragmentary elevation showing the top of the bin during the operation of depositing the material therein.

Referring to the drawing by numerals, each of which is used to indicate the same or similar parts in the different figures, the construction shown comprises a bin or casing 1, shown as of cylindrical form. This bin is shown as closed at the top by a top wall or partition 2, though this feature is not essential, and as shown it has a bottom wall 3 of inverted conical form for convenience in discharging the material. The important feature of the bin whereby control of the comminuted materials deposited therein as described, is accomplished, consists of a series of baffle plates or dams 4 therein. These baffles 4 are spaced apart to form a succession of chambers or spaces 5 between the baffles and a center

chamber 6 enclosed by the front baffles 8. The baffles are of successively decreasing elevation as to their top edges, as hereinafter described, the central chamber or space 6 which is immediately
5 beneath the feed spout or chute 7 and is enclosed by the first baffle 8 of the series 4 being of greatest altitude.

This chute or feed spout 7 in the preferred form of the invention is of particular interest in
10 that it is mounted to rotate about its axis which as shown is vertical and is provided at the lower or discharge end with an inclined elbow or nozzle 10.

In accordance with the details shown, the lower
15 end of the feed pipe 11 is connected by a suitable swivel or sleeve joint 12 with the nozzle pipe or shank 14 and this nozzle pipe or shank 14 is mounted in suitable bearings 14' and provided with a bevel gear 15 mounted thereon and preferably concentric therewith, it being understood
20 that any suitable rotary drive may be substituted for the one shown. In the form illustrated, an electric motor 16 is mounted on the top wall or cover 2 and this motor is connected by a suitable reducing gear drive 13, the casing for which is indicated at 17. A bevel pinion 18 operated by
25 the reducing drive mechanism meshes with the bevel gear 15 imparting a rotary motion to the nozzle 7, it being understood that any rotary speed of the nozzle which may be found suitable
30 to the distribution of the material being handled may be imparted thereto in the manner described or by any convenient mechanism.

In the form shown a vertical deflector plate 19
35 is provided being shown as attached to the nozzle in front of the nozzle opening 20 to prevent projection of the material from the nozzle for any considerable distance transversely to the baffle plates which protection would tend to segregate
40 the materials in accordance with the variation of size and/or specific gravity.

As already pointed out, the top edges 4', 4'', 4''' of baffles 4 are of successively varying decreasing elevation, the baffle 8 which encloses the
45 first chamber or compartment 6 directly beneath the feed nozzle being highest. The baffle 21 which is next beyond the baffle 8 being next in height, forms a wall of the second compartment or chamber 22 which is immediately adjacent the chamber
50 6 beneath the nozzle 7 and enclosed between baffles 8 and 21. The baffle 24 which is next to the baffle 21 is of correspondingly and still further reduced height and serves as a wall of the third
55 compartment or chamber 25 which is next beyond the chamber 22, and enclosed between baffle 21 and baffle 24, and the baffle 26 which is next beyond the baffle 24 is of still further reduced
60 height and serves to enclose a chamber 27 between baffles 24 and 26. This chamber is beyond the chamber 25 and correspondingly spaced outwardly from the nozzle 7. Beyond the chamber 27
65 between the outer baffle 26 and the outer casing or wall 28 of the bin 1, and bounded by said baffle and wall is a chamber 29.

In the form of the invention shown all of the baffles of the series 4 are of cylindrical form, open
70 at the ends, and they are concentrically arranged, the central chamber 6 being cylindrical and of relatively small diameter with its axis vertical, and the successive chambers 22, 25, 27, 29 being of annular cross section and concentric therewith,
75 each being bounded by the two adjacent baffles. This exact form and arrangement, while it is convenient and regarded as cheapest to construct, is not regarded as essential to the proper function-

ing of the device of the invention. However, this form and arrangement is believed to contribute to the efficient and satisfactory operation of the device to a considerable degree.

As already pointed out, the bottom wall 3 of
80 the bin is preferably of inverted frustro conical form as shown, and in order that the material lodged in the successive concentric chambers 6, 22, 25, 27—29, may be freely discharged from the
85 bin without segregation, and more or less automatically without the necessity for opening and closing the bottom of each chamber, the baffles 8, 21, 24, 26 are spaced as to their bottom edges 30, 31, 32, 33 slightly upwardly from the bottom wall
90 3, and this bottom wall 3 is provided at its lower extremity or vertex 34 with a discharge spout 35 which is controlled in any suitable manner as by means of an outlet or discharge valve or gate 36.

In the operation of the invention the comminuted material to be stored is admitted by
95 way of the feed spout the rotary inclined nozzle 7 or in any suitable manner. The rotary feature of the nozzle, while it is regarded as helpful in the distribution of the material, eliminating
100 any tendency of the material to clog and accumulate at one side with a consequent sliding or rolling of the material laterally within the separate chambers down the incline due to the angle of repose it is not regarded as essential
105 under all circumstances to the useful operation of the apparatus.

The valve 36 at the bottom being closed, the material first introduced accumulates in the central chamber 6 which is enclosed by the highest
110 baffle 8. When this central chamber or compartment is filled, the material due to the rotation of the nozzle, piles up on top of the chamber at a uniform angle on all sides, accumulating until the angle of repose is reached when the
115 material thereafter delivered to the bin slides or rolls down the short inclined surface of the material at the top of the first chamber or compartment 8, overflowing baffle 6, and is all of it delivered to the second compartment 22 being
120 uniformly distributed around this compartment due to the rotation of the nozzle whereby accumulation on one side or the other of the compartment and consequent rolling of the material
125 laterally with the resulting segregation of the particles of different sizes is avoided. In other words, the material is dropped from the edge of the first baffle into the second compartment 22
130 which is an annular cross section, uniformly at all points in the cross section practically without rolling or sliding within said chamber 22, and consequently without segregation.

The operation up to this point is illustrated in Figure 3, the accumulated material being indicated in a general way by reference character
135 40, and that accumulated at the top of the first compartment 6 by reference character 41. Chambers 6 and 27 are filled and the material is overflowing into chamber 25. As the influx of material from the feed spout or nozzle 7 continues, the bin 22 being filled and the material
140 heaped up thereon until the angle of repose is reached, the material thereafter slides or rolls down the incline of the angle of repose, the surface being indicated by reference character 42 overflowing baffle 21 into chamber or compartment
145 25, and due to the rotation of the nozzle it is deposited uniformly about the compartment or chamber 25. The filling process being continued, the successive chambers or compartments 25, 26, 29 are filled in the manner described, each
150

compartment being filled and the material being heaped thereon until the angle of repose is reached, when it overflows the corresponding baffle falling into the next compartment.

In this connection it will be noted that while this concentric cylindrical arrangement is not essential to the successful operation of the invention, it is the preferred arrangement and is found desirable. Also, the operation which results is more efficient when and if the top edges of the baffles 8, 21, 24, 26 are in alignment fixing and determining a line or conical plane which is disposed at an angle approaching more nearly to the vertical than the angle of repose of the material to be stored. But such arrangement is in no wise essential.

The bin or such portion of it as it is desired to fill having been thus supplied with material to be stored, the valve 36 at the bottom being closed during the filling operation, the material is discharged into any receptacle presented for this purpose by placing the receptacle beneath the discharge spout 35 and opening the valve 36. When the material is thus discharged, it is delivered more or less simultaneously from the successive compartments 6, 22, 25, 27 and 29, being passed continuously down the inclined bottom plate 3, the bottom edges 30, 31, 32, 33 serving to prevent any tendency of the material to roll down this surface in such a manner that the particles can pass each other and thus become in any way segregated, though for the greater part of the period of the discharge the fact that the space within the lower end of the bin is filled so that the different particles of material move downwardly more or less uniformly without any tendency to pass each other, has the effect of preventing segregation of particles of different sizes, also the bottom member 3 being oppositely inclined as compared to the surface of the material at 42, has a tendency to reverse any slight degree of segregation which may take place within the chambers 22, 24, etc. due to the distribution of the material in the direction of the radius as it is deposited therein.

I have thus described specifically and in detail a non segregating storage bin embodying the features of my invention in the preferred form in order that the manner of applying, constructing, operating and using the invention may be fully understood, however, the specific terms herein are used descriptively rather than in a limiting sense, the scope of the invention being defined in the claims.

What I claim as new and desire to secure by Letters Patent is:

1. A storage bin for comminuted materials having a series of tubular upright baffles arranged with their top edges lying respectively and wholly in different horizontal planes and at successively reduced altitudes extending outwardly so as to form a series of relatively narrow elongated concentric tubular compartments of different heights, the longest and highest baffle serving as a wall for the innermost compartment, the next longest and highest baffle serving as a wall for the next outer compartment and so on successively throughout the series, said storage bin being provided at its bottom with means for sup-

porting the material within the compartments and for discharging the same therefrom at the will of the operator, the bottom of the bin being in the form of a conical wall inclined toward the discharge, the lower edges of said tubular baffles being spaced substantially equidistant from said conical bottom and means for depositing the material in the first compartment whereby when said compartment is filled and the material heaped up therein to the angle of repose, it overflows the top of the innermost baffle into the next outer compartment, and when each compartment in turn is filled, the material overflows the corresponding baffle into the next succeeding outer compartment, said baffle serving to prevent segregation of the material due to the very rapid progress of the larger particles down the incline of the surface of the material.

2. A storage bin for comminuted materials comprising a substantially closed cylindrical container having a relatively deep conical bottom the walls of which are inclined inwardly and downwardly to a central discharge chute, a series of concentric tubular upright baffles arranged within said compartments and substantially concentric therewith, the lower edges of said tubular baffles lying wholly within superimposed planes of truncation of said conical bottom, the upper edges of said baffles similarly lying wholly within respective planes of truncation of an imaginary upright cone adjacent the top of said compartment whereby said baffles form a series of relatively narrow elongated concentric tubular compartments of different heights, the longest and highest baffle serving as a wall for the innermost compartment, the next longest and highest baffle serving as a wall for the next higher compartment and so on successively throughout the series, a valve for said discharge spout and means for depositing the material to be stored within the said cylinder, said means being in the form of a rotatable nozzle.

3. A storage bin for comminuted materials comprising a substantially closed cylindrical container having a relatively deep conical bottom, the walls of which are inclined inwardly and downwardly to a central discharge chute, a series of concentric tubular upright baffles arranged within said compartment and substantially concentric therewith, the lower edges of said tubular baffles lying wholly within superimposed planes of truncation of said conical bottom, the upper edges of said baffles similarly lying wholly within the respective planes of truncation of an imaginary upright cone adjacent the top of said compartment whereby said baffles form a series of relatively narrow elongated concentric tubular compartments of different heights, the lowest and highest baffle serving as a wall for the innermost compartment, the next longest and highest baffle serving as a wall for the next higher compartment and so on successively throughout the series, a valve for said discharge spout and means for depositing the material to be stored within the said cylinder, said means being in the form of a laterally inclined nozzle having a shield for restricting the lateral projection of the material, and means for rotating said nozzle.

AUGUSTUS J. SACKETT.