July 24, 1962 H. J. DONELSON, JR 3,045,840

MATERIAL SPREADING MECHANISM

Filed June 30, 1961

3 Sheets-Sheet 1

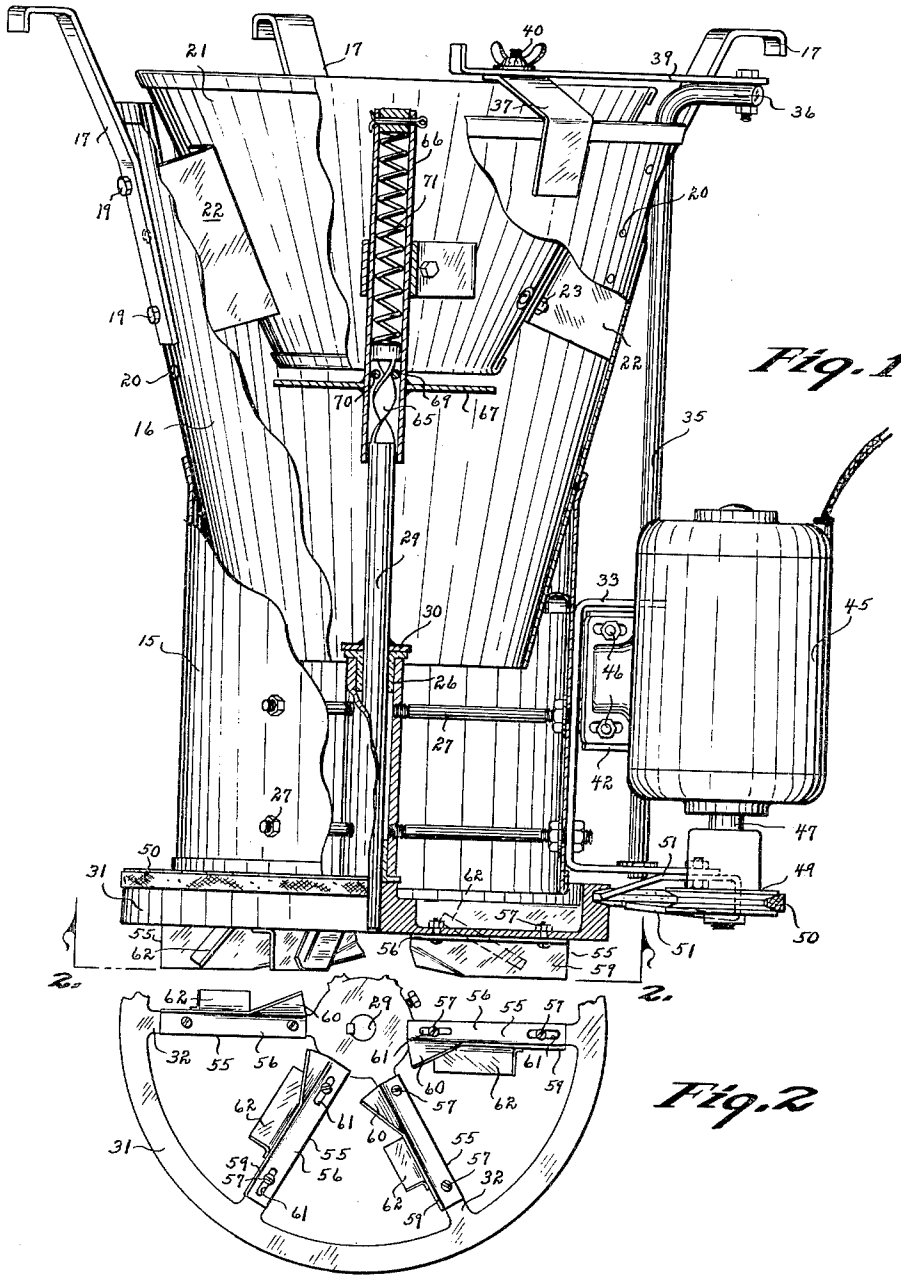


Fig. 1

Fig. 2

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MATERIAL SPREADING MECHANISM

Filed June 30, 1961 3 Sheets-Sheet 2

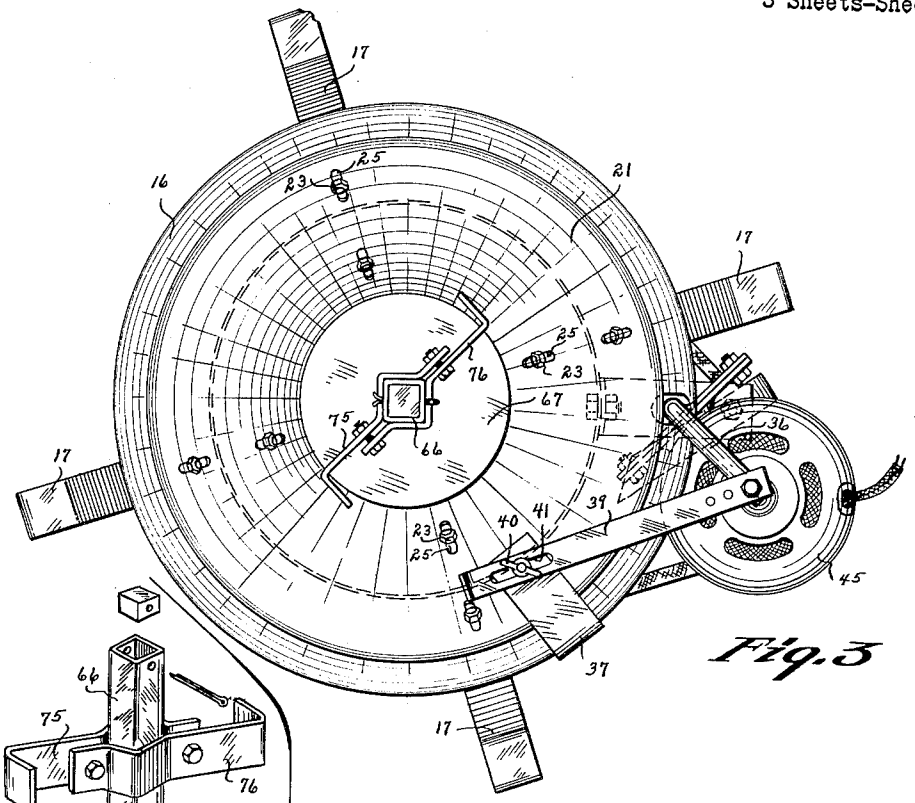


Fig. 3

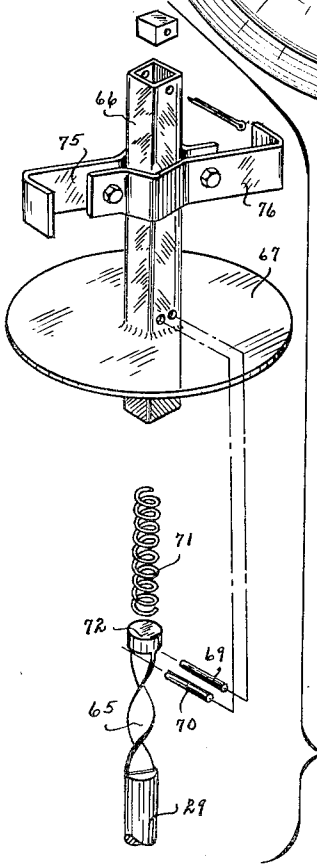


Fig. 4

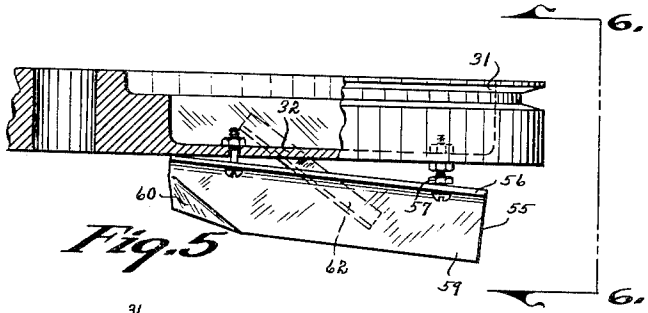


Fig. 5

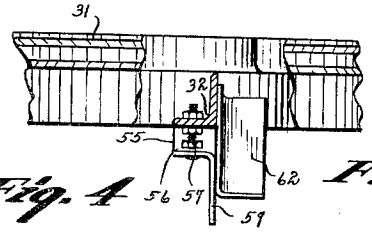


Fig. 6

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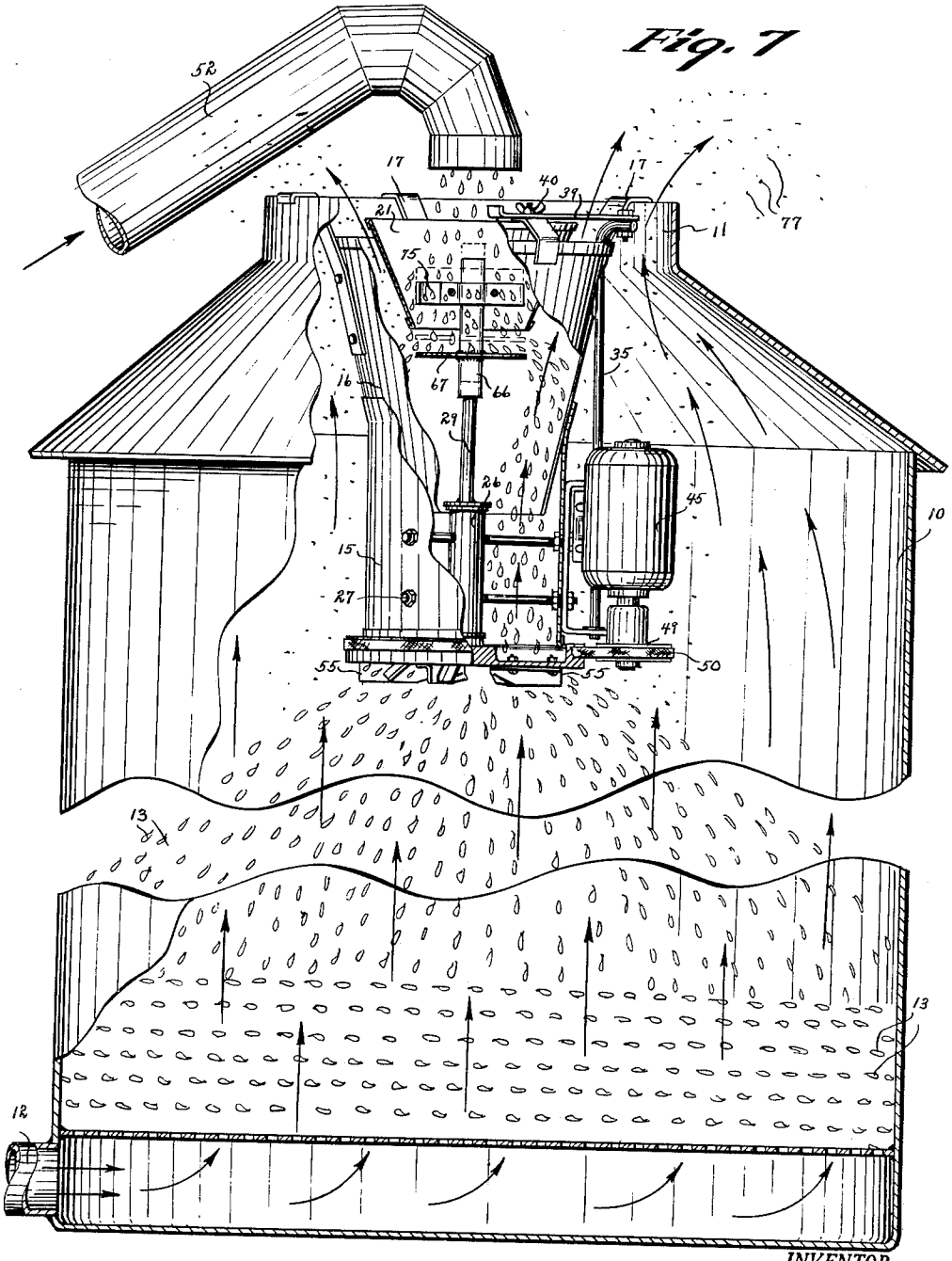
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MATERIAL SPREADING MECHANISM

Filed June 30, 1961 3 Sheets-Sheet 3

Fig. 7



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3,045,840
MATERIAL SPREADING MECHANISM

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11 Claims. (Cl. 214—17)

This invention relates to a material spreading means and more particularly to a spreader that will evenly and uniformly deposit material such as kernels of corn, silage, beans and the like in closed storage space areas such as granaries, silos, and the like.

The desirability of uniform density of materials in these storage areas has only become knowingly critical in rather recent times. The necessity became apparent with the new type of granaries wherein the material was aerated and/or dry heated as it flowed into the storage housing. The air or heated air is passed through the granary from bottom to top. It is the custom to pour the grain or the like through a spout into the granary from its top. The grain will first pile up in the bottom central area of the storage space and therefore will be much more dense or compact in such poured area than that of the surrounding area. This means that in the drying phase, the surrounding area will be successfully treated while the compacted area will not.

Furthermore, when the grain or like piles up in a frusto-cone inside the bin, great downwardly and outwardly pressures are created, which may well distort or break the side walls of the bin. It is because of these problems that it has been the practice to place one or two workers with shovels in the granary to move the grain or like around and to keep it horizontally level during the time it is being poured into the top of the bin. Obviously, such work is most difficult as it is under heat and dust conditions.

Some effort has been to improve the situation and mechanical devices have been produced such as is shown in my issued United States Letters Patent No. 2,980,009 issued April 18, 1961, on a Spreader for Confined Areas. While this device was a considerable improvement over old methods, it did have certain shortcomings. Firstly, it did not automatically compensate for changing volume of grain or like being introduced into the device. Secondly, there was no provision for changing nor adjusting the scattering means to meet different conditions. The present invention is an improvement on the device disclosed in my herebefore referred to issued patent.

Therefore, one of the principal objects of my invention is to provide a means that will successfully, uniformly and evenly spread grain or the like into a granary or the like during the placement of the material into such storage space, and regardless of the changing volume of material being fed into the device.

A further object of this invention is to provide a scatter means for use when pouring material into a storage area that eliminates the need of workmen within the storage area at any time.

A still further object of this invention is to provide a material scattering means for granaries that cleans the objectionable chaff, dirt and the like from the material as it is being deposited in the storage area.

A still further object of this invention is to provide a material spreader for granaries or like that has adjustable material scattering blades.

A still further object of this invention is to provide a powered material spreader means that has a self cleaning belt driven power pulley wheel.

A still further object of my invention is to provide a material spreader for confined areas that is economical of manufacture and durable in use.

These and other objects will be apparent to those skilled in the art.

My invention consists in the construction, arrangements, and combination, of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, specifically pointed out in my claims, and illustrated in the accompanying drawings, in which:

FIG. 1 is a side sectional view of my device in use,

FIG. 2 is a bottom view of a portion of the scatter wheel taken from line 2—2 of FIG. 1,

FIG. 3 is a top plan view of my device,

FIG. 4 is an enlarged perspective exploded view of the parts that control the movement of the grain or like passing through the device,

FIG. 5 is an enlarged side sectional view of a portion of the scatter wheel illustrating the vertical adjustment of one of the material scattering bars,

FIG. 6 is an end view of the scattering bar shown in FIG. 5 and is taken from line 6—6 of that figure, and

FIG. 7 is a side sectional of my device installed and in use.

In the drawings I have designated the ordinary granary by the numeral 10, having the top central opening 11. The numeral 12 designates a conduit having its outlet end communicating with the inside bottom of the granary and its other end adapted to be in communication with a source of air or heated air under pressure. Such air flow may be through the granary during and/or after the placement of the material in the granary. I have used the numeral 13 to designate material such as grain or the like. It is with such a storage space that I use my device and which I will now describe in detail. The numeral 15 designates a vertical tube housing open at both ends, and having a diameter less than that of the diameter of the opening 11 of the granary. Secured in the open upper end portion of the tube 15 in an upwardly flared tubular member 16 as shown in FIG. 1. The numeral 17 designates a plurality of our hook arms secured by bolt means 19 to the upper outer portion of the flared tubular member 16. These spaced apart hook arms 17 are vertically adjustably mounted on the member 16 by the member 16 having a plurality of bolt receiving holes 20. When the device is installed for use, the arms 17 hook over the rim of the top opening of the granary, thereby supporting the entire unit downwardly within the upper portion of the granary as shown in FIG. 7. The tubular members 15 and 16 provide the main housing of the device and the upper end of the tubular member 16 is of a diameter less than that of the diameter of the upper open end 11 of the granary. The numeral 21 designates a funnel shaped material receiving hopper vertically adjustably secured in the upper end portion of the tubular member 16. The diameter of the lower portion of the hopper 21 is much less than that of the diameter of the tubular member 16 and it is held in spaced relationship to the tubular member 16 by brackets 22. The hopper 21 is vertically adjustable by any suitable means. In the drawings I show bolt means 23 extending through the brackets 22 and through vertical slots 25 through the wall of the hopper. The numeral 26 designates a centrally located vertical bearing in the lower portion of the tubular member 15. This bearing member is supported and held by the bolt means 27 as shown in FIG. 1. The numeral 29 designates a vertical rotatably mounted shaft journaled in the bearing 26. This shaft 29 extends upwardly into the flared tubular portion 16 and is prevented from downward sliding movement by a retaining stop wall 30 engaging the upper end of the bearing 26. Rigidly secured on the lower end of the shaft 29 and directly below the

bottom of the tubular member 15 is the large belt pulley wheel 31 having the radially extending spokes 32 as shown in FIG. 2. This wheel 31 has a diameter slightly greater than that of the diameter of the tubular member 15 and its upper outer rim portion extends upwardly to a horizontal plane slightly above the bottom horizontal plane of the member 15. The numeral 33 designates a C-shaped bracket secured to the outer side of the tubular member 15. The numeral 35 designates a vertical rod rotatably but not slidably mounted on the bracket 33. The upper end portion 36 of the rod 35 is bent to extend horizontally and to extend horizontally about the top of the flared tubular member 16. The numeral 37 designates a bracket secured to the upper end of the tubular member 16. The numeral 39 designates a control lever having one end hingedly secured to the outer end portion of the portion 36 of the rod 35 and its other end slidably extending over the bracket 37. The numeral 40 designates a wing nut extending through the bracket 37 and through a longitudinal slot 41 in the arm 39 as shown in FIG. 3. By this arrangement of parts the position rotation of the rod 35 may be adjustably selected and locked. The numeral 42 designates a plate on the lower end portion of the rod 35. The numeral 45 designates an electric motor horizontally adjustably secured to the plate 42 by a bolt means 46. The power shaft 47 of the motor extends downwardly and has secured to its lower end the variable pitch pulley wheel 49. The numeral 50 designates an endless belt embracing the pulley wheels 31 and 49. Secured to the lower end of the bracket 33 is a bar having its length loosely embracing the belt 50 and with one of its ends extending into the groove of the pulley wheel 31 substantially directly between the pulley wheel 49 and the pulley wheel 31 and at a point where the endless belt 50 is not engaging the pulley wheel 31. The purpose of the end of the member so extending into the groove of the pulley wheel 31 is to automatically clear it of any foreign material that might collect in the pulley wheel groove. By the bent bar 51 loosely embracing the belt 50, the belt even if it were to become detached from the pulley wheel 31 or pulley wheel 49 would be retained and prevented from falling downwardly into the bin and lost. By the arm 39 being adjustably positionable the motor may be swung horizontally to tighten the belt 50 or swung in the opposite direction to so loosen it that the pulley wheel 31 will not be rotated. This loosening of the belt 50 on the pulley wheel 49, by its retention thereon, is aided by the bent bar 51 loosely embracing the belt. Therefore, the rotation of the pulley wheel 31 is controllable from a position at the top of the granary. When the device is installed, the grain or like 13 is deposited in the hopper 21 by any suitable conveyor means 52. The material placed in the hopper portion 21 will move downwardly from the open bottom end of the hopper into the two portions 15 and 16 and thence downwardly and outwardly therefrom between the spokes 32 of the pulley wheel 31. Therefore, it is necessary for the scattering action to be affected by the rotating spokes of the large pulley wheel 31. To encourage this scattering action of the material as it falls through the pulley wheel 31, I provide material engaging scatter bar means 55 on each of the spokes 32 of the pulley wheel 31. I find that under different conditions and for different materials, different types of scatter bars are desirable. Even with a given material being placed in the bin, the scatter bar means on the various spokes of the pulley wheel 31 should differ from each other. All of the scatter bar means regardless of type have a flat base portion 56 which is secured by bolts 57 to the underside of a spoke 32. Each scatter bar means also has a downwardly extending flange portion 59 with its inner corner end 60 bent downwardly and laterally to catch the falling grain as shown in FIG. 1. The scatter bar means may be longitudinally adjustable on the spokes by having the bolt means extend to slot openings 61 of the base portion as shown in FIG. 2. The widths and lengths of the downwardly extending flange portions 59 may and should vary. Also, at least on some of the scatter bars I provide a horizontally extending flange 62. The length of this horizontal elongated flange 62 extends downwardly and outwardly and is spaced apart and above the inner belt corner end portion 60. This elongated bar 62 may extend upwardly to a position above a spoke 32 as shown by broken lines in FIG. 1.

Obviously if the material entering the hopper 21 was fed into the hopper at a proper uniform rate, the material would be evenly scattered and distributed in the bin. To obtain a proper flow of material through the device and to even properly spread it within the device and before it is engaged by the material scattering bar means, it is necessary to provide a material control means directly below the open end of the hopper 21. However, the material feeding means 52 is not even as to volume flow and therefore the control means must automatically adjust to compensate for their handling periodical large amounts of material in the hopper. I will now describe how this control portion of my device functions. The upper end portion of the shaft 29 is formed into a spiral auger portion 65. Slidably mounted on the upper portion of the shaft 29 is an elongated member 66. This elongated member 66 extends upwardly within the center area of the hopper 21 and has on its lower portion a horizontal radial plate 67 positioned below the bottom open end of the hopper 21 as shown in FIG. 1. The numerals 69 and 70 designate two parallel spaced apart parts extending through the elongated member 66 and engaging each side respectively of the auger portion 65 of the shaft 29 as shown in FIG. 1. By this arrangement of parts any relative rotation between the elongated members 66 and shaft 29 will cause the cylinder to either move downwardly or upwardly depending upon the direction of its relative rotation to the shaft 29. Normally, however, the elongated member 66 will be held in an elevated position as shown in FIG. 1 by coiled spring 71 inside the upper end portion of the elongated member 66, having its upper end operatively connected to the elongated member 66 and its lower end yieldingly engaging the top of the shaft 29. Therefore, the coil spring 71 will yieldingly cause the elongated member 66 to rotate clockwise relative to the shaft 29 and move upwardly until the parts 69 and 70 engage the top head 72 of the shaft 29. The elongated member 66 supports two vertically adjustable material engaging arms 75 and 76. By this arrangement of parts material will pass from the hopper onto the spinning control plate 67 and from the plate 67 material will be cast downwardly and outwardly to the pulley wheel 31. However, if a great amount of material exists within the hopper 21 at any one time, the resistance bar arms 75 and 76 will engage this mass of material and will tend to slow down the rotation of the shaft elongated member 66 relative to the shaft 29. This will cause the elongated member 66 and control plate 67 to move downwardly relative to the hopper 21 and permit a greater amount of material to pass by the control plate 67. As soon as the excess amount of material in the hopper 21 has been disposed of, the resistance to the rotation of the arms 75 and 76 will be lessened accordingly and the spring 71 will cause the rotation of the elongated member 66 and plate 67 relative to the shaft 29 and the plate 67 will move upwardly to reduce the distance between the lower end of the hopper 21 and plate 67. In some situations and with different materials, it might be desirable to reverse the action of movement of the plate 67 and this may be accomplished merely by reversing the motor or reversing the rotation of the shaft 29. In such a case the plate 67 would move upwardly to restrict and prevent an excessive amount of material from passing from the hopper through the device.

As before indicated, the scatter bars 55 may be longitudinally adjusted or even adjusted to extend downwardly at various angles as shown in FIG. 5 and FIG. 6. This

may be accomplished by any suitable means such as placing washers or nuts between the spoke and scatter bar with the nuts or washers embracing the bolt means.

By the use of my device there will be no dense areas in the grain or the like accumulating in the bottom of the building. The grain or the like will be evenly distributed and if air or warmed air is passed upwardly through the grain or the like, the same will evenly and uniformly contact all of the material thereby drying it uniformly. Still another advantage realized by the use of my device is the separating and elimination of dust, chaff and the like foreign matter. The reason for this is that with the downwardly passing grain being scattered as shown in FIG. 7, the air column from the pipe 12 will pass upwardly through such separated kernels of grain carrying with it the undesired light foreign matter. The escape of this undesired foreign matter is made possible by having the diameter of the tubular housing 16 less than that of the diameter of the opening 11. Also, by the hopper 21 being spaced from the tubular member 16, the chaff, dirt and like 77 may pass upwardly between the inside of the tubular member 16 and the outer side of the hopper 21 as shown in FIG. 7. Even if this rising air column does not remove all of the chaff and the like, the remaining foreign matter will be evenly distributed through the collected material in the bottom of the building.

From the foregoing it will be readily seen that the use of my device does not only eliminate workmen inside the building as it is being filled with material but it automatically uniformly deposits the grain or the like into the storage area. As herebefore indicated, my apparatus may be used for the depositing of various materials.

Some changes may be made in the construction and arrangement of my Material Spreading Mechanism without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims, any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

I claim:

1. In combination, a storage material building having an opening in its upper area, a vertical tubular housing secured to said building and associated with its opening, a vertical shaft rotatably mounted in said tubular housing, a spoked pulley wheel secured to the lower end of said shaft, material engaging bar fins on the spokes of said pulley wheel, a prime mover having a drive shaft, a pulley wheel on said drive shaft, an endless belt embracing said two pulley wheels, a hopper having an open bottom in the upper portion of said housing, an elongated member slidably embracing the upper end portion of said shaft and extending upwardly into said hopper, means for directly transmitting rotation of said shaft to said elongated member, said means allowing sliding movement of said elongated member upon said shaft, a spring means for yieldingly holding said elongated member in one direction of its slidable movement on said shaft, a control plate on said elongated member and below said hopper, and at least one material engaging arm on said elongated member and positioned in said hopper.

2. In combination, a storage material building having an opening in its upper area, a vertical tubular housing detachably secured to said building and associated with its opening, a vertical shaft rotatably mounted in said tubular housing, a spoked pulley wheel secured to the lower end of said shaft, material engaging bar fins on the spokes of said pulley wheel, a prime mover having a drive shaft, a pulley wheel on said drive shaft, an endless belt embracing said two pulley wheels, a hopper having an open bottom in the upper portion of said housing, an elongated member slidably embracing the upper end portion of said shaft and extending upwardly into said hopper, means for directly transmitting rotation of said shaft to said elongated member, said means allowing sliding movement of said elongated member upon said shaft, a spring means for yieldingly holding said elongated member in one direction of its slidable movement on said shaft, a control plate on said elongated member and below said hopper, and at least one material engaging arm on said elongated member and positioned in said hopper.

3. In combination, a storage material building having an opening in its upper area, a vertical tubular housing secured to said building and associated with its opening, a vertical shaft rotatably mounted in said tubular housing, a spoked pulley wheel secured to the lower end of said shaft, material engaging bar fins on the spokes of said pulley wheel, a prime mover having a drive shaft, a pulley wheel on said drive shaft, an endless belt embracing said two pulley wheels, a hopper having an open bottom in the upper portion of said housing, an elongated member slidably embracing the upper end portion of said shaft and extending upwardly into said hopper, means for directly transmitting rotation of said shaft to said elongated member, said means allowing sliding movement of said elongated member upon said shaft, a spring means for yieldingly holding said elongated member in one direction of its slidable movement on said shaft, a control plate on said elongated member and below said hopper, and at least one material engaging arm vertically adjustable on said elongated member and positioned in said hopper.

4. In combination, a storage material building having an opening in its upper area, a vertical tubular housing secured to said building and associated with its opening, a vertical shaft rotatably mounted in said tubular housing, a spoked pulley wheel secured to the lower end of said shaft, material engaging bar fins longitudinally adjustable on the spokes of said pulley wheel, a prime mover having a drive shaft, a pulley wheel on said drive shaft, an endless belt embracing said two pulley wheels, a hopper having an open bottom in the upper portion of said housing, an elongated member slidably embracing the upper end portion of said shaft and extending upwardly into said hopper, means for directly transmitting rotation of said shaft to said elongated member, said means allowing sliding movement of said elongated member upon said shaft, a spring means for yieldingly holding said elongated member in one direction of its slidable movement on said shaft, a control plate on said elongated member and below said hopper, and at least one material engaging arm on said elongated member and positioned in said hopper.

5. In combination, a storage material building having an opening in its upper area, a vertical tubular housing secured to said building and associated with its opening, a vertical shaft rotatably mounted in said tubular housing, a spoked pulley wheel secured to the lower end of said shaft, material engaging bar fins on the spokes of said pulley wheel, a prime mover having a drive shaft, a pulley wheel on said drive shaft, an endless belt embracing said two pulley wheels, a hopper having an open bottom in the upper portion of said housing, an elongated member slidably embracing the upper end portion of said shaft and extending upwardly into said hopper, means for directly transmitting rotation of said shaft to said elongated member, said means allowing sliding movement of said elongated member upon said shaft, a spring means for yieldingly holding said elongated member in one direction of its slidable movement on said shaft, a control plate on said elongated member and below said hopper, and at least one material engaging arm on said elongated member and positioned in said hopper; at least one of said material engaging bar fins being vertically angularly adjustable relative to the pulley wheel spoke to which it is secured.

6. In combination, a storage material building having an opening in its upper area, a vertical tubular housing secured to said building and associated with its opening, a vertical shaft rotatably mounted in said tubular housing, a spoked pulley wheel secured to the lower end of said shaft, material engaging bar fins on the spokes of said pulley wheel, a prime mover having a drive shaft, a

pulley wheel on said drive shaft, an endless belt embracing said two pulley wheels, a hopper having an open bottom in the upper portion of said housing, an elongated member slidably embracing the upper end portion of said shaft and extending upwardly into said hopper, means for directly transmitting rotation of said shaft to said elongated member, said means allowing sliding movement of said elongated member upon said shaft, a spring means for yieldingly holding said elongated member in one direction of its slidable movement on said shaft, a control plate on said elongated member and below said hopper, at least one material engaging arm on said elongated member and positioned in said hopper, and a downwardly and outwardly extending flange on at least one of said bar fins.

7. In combination, a storage material building having an opening in its upper area, a vertical tubular housing secured to said building and associated with its opening, a vertical shaft rotatably mounted in said tubular housing, a spoked pulley wheel secured to the lower end of said shaft, material engaging bar fins on the spokes of said pulley wheel, a prime mover having a drive shaft, a pulley wheel on said drive shaft, an endless belt embracing said two pulley wheels, a hopper having an open bottom in the upper portion of said housing, an elongated member slidably embracing the upper end portion of said shaft and extending upwardly into said hopper, means for directly transmitting rotation of said shaft to said elongated member, said means allowing sliding movement of said elongated member upon said shaft, a spring means for yieldingly holding said elongated member in one direction of its slidable movement on said shaft, a control plate on said elongated member and below said hopper, at least one material engaging arm on said elongated member and positioned in said hopper, means for shifting the position of said prime mover relative to said spoked pulley wheel, and a belt loop bracket substantially embracing said endless belt and operatively secured to said tubular housing.

8. In combination, a storage material building having an opening in its upper area, a vertical tubular housing secured to said building and associated with its opening, a vertical shaft rotatably mounted in said tubular housing, a spoked pulley wheel secured to the lower end of said shaft, material engaging bar fins on the spokes of said pulley wheel, a prime mover having a drive shaft, a pulley wheel on said drive shaft, an endless belt embracing said two pulley wheels, a hopper having an open bottom in the upper portion of said housing, an elongated member slidably embracing the upper end portion of said shaft and extending upwardly into said hopper, means for directly transmitting rotation of said shaft to said elongated member, said means allowing sliding movement of said elongated member upon said shaft, a spring means for yieldingly holding said elongated member in one direction of its slidable movement on said shaft, a control plate on said elongated member and below said hopper, at least one material engaging arm on said elongated member and positioned in said hopper, means for shifting the position of said prime mover relative to said spoked pulley wheel, and a belt loop bracket substantially embracing said endless belt and operatively secured to said tubular housing; part of said belt loop extending into the groove of said spoked pulley wheel or clearing said groove of undesirable foreign matter.

9. In combination, a storage material building having an opening in its upper area, a vertical tubular housing secured to said building and associated with its opening, a vertical shaft rotatably mounted in said tubular housing, a spoked pulley wheel secured to the lower end of said shaft, material engaging bar fins on the spokes of said pulley wheel, a prime mover having a drive shaft, a pulley wheel on said drive shaft, an endless belt embracing said two pulley wheels, a hopper having an open bottom in the upper portion of said housing, an elongated member slidably embracing the upper end portion of said shaft and extending upwardly into said hopper, means for directly transmitting rotation of said shaft to said elongated member, said means allowing sliding movement of said elongated member upon said shaft, a spring means for yieldingly holding said elongated member in one direction of its slidable movement on said shaft, a control plate on said elongated member and below said hopper, and at least one material engaging arm on said elongated member and positioned in said hopper; said hopper being spaced apart from the inside of said tubular housing.

10. In combination, a storage material building having an opening in its upper area, a vertical tubular housing secured to said building and associated with its opening, vertically adjustable hook arms on said tubular housing for engaging said building and suspending said tubular housing in said building below the opening in the upper area of said building, a spoked pulley wheel secured to the lower end of said shaft, material engaging bar fins on the spokes of said pulley wheel, a prime mover having a drive shaft, a pulley wheel on said drive shaft, an endless belt embracing said two pulley wheels, a hopper having an open bottom in the upper portion of said housing, an elongated member slidably embracing the upper end portion of said shaft and extending upwardly into said hopper, means for directly transmitting rotation of said shaft to said elongated member, said means allowing sliding movement of said elongated member upon said shaft, a spring means for yieldingly holding said elongated member in one direction of its slidable movement on said shaft, a control plate on said elongated member and below said hopper, and at least one material engaging arm on said elongated member and positioned in said hopper.

11. In combination, a storage material building having an opening in its upper area, a vertical tubular housing secured to said building and associated with its opening, a vertical shaft rotatably mounted in said tubular housing, a spoked pulley wheel secured to the lower end of said shaft, material engaging bar fins on the spokes of said pulley wheel, a prime mover having a drive shaft, a pulley wheel on said drive shaft, an endless belt embracing said two pulley wheels, a hopper having an open bottom in the upper portion of said housing, an auger thread on the upper portion of said vertical shaft, an elongated member rotatably slidably embracing the upper portion of said vertical shaft and extending upwardly into said hopper, pins extending through said an elongated member and in engagement with the auger thread on said vertical shaft, a coil spring in said an elongated member having one end engaging said an elongated member and its other end yieldingly engaging the top end of said vertical shaft, a material control plate on said an elongated member and below said hopper, and at least one material engaging member on said an elongated member and positioned within said hopper.

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