No. 786,791. PATENTED APR. 11, 1905.

J. M. AKERS.

PNEUMATIC CONVEYER.

APPLICATION FILED MAY 4, 1904.

FIG. 7.

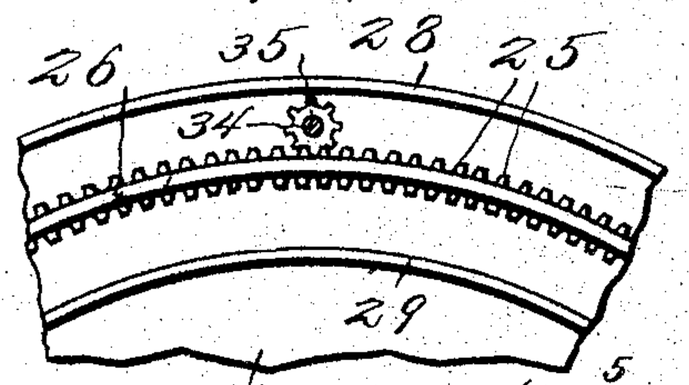


FIG. 1.

FIG. 3.

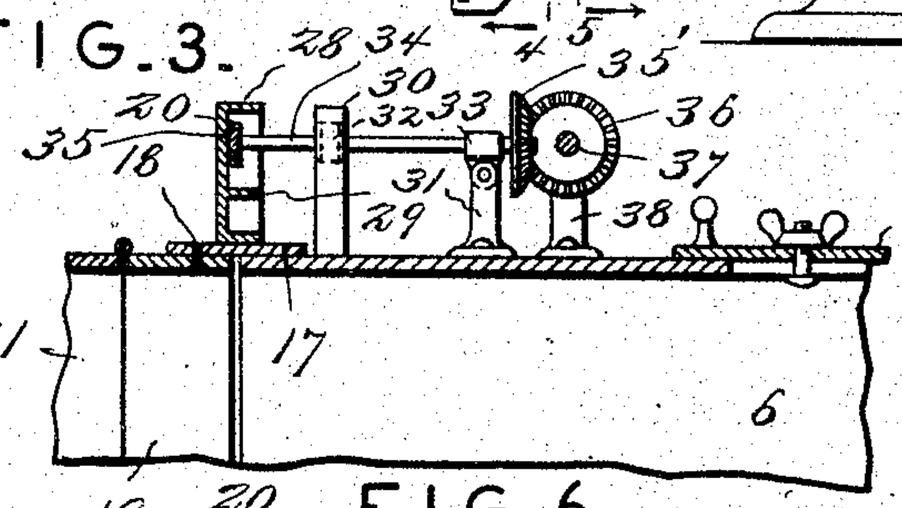


FIG. 2.

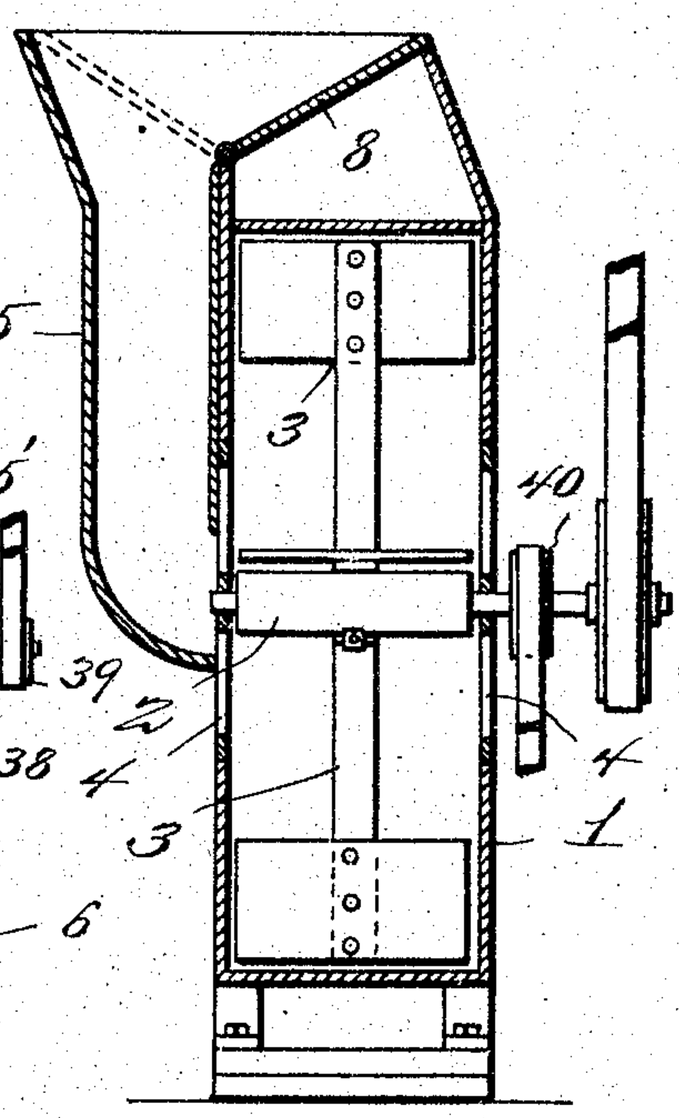


FIG. 6.

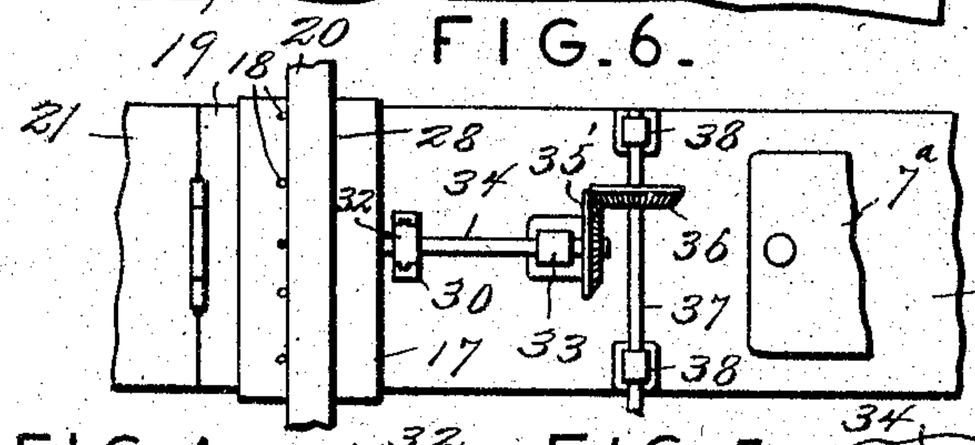


FIG. 4.

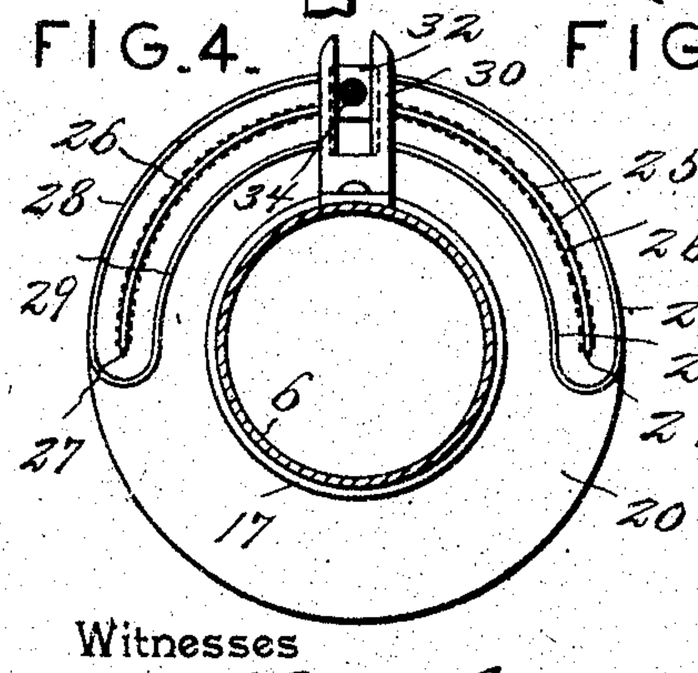
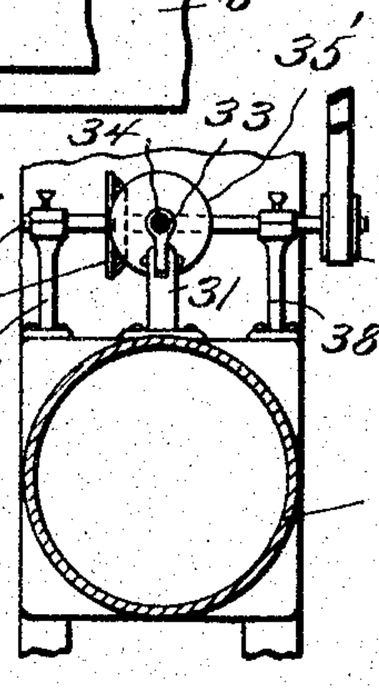


FIG. 5.



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No. 786,791. Patented April 11, 1905.

UNITED STATES PATENT OFFICE.

JAMES M. AKERS, OF GAYS, ILLINOIS.

PNEUMATIC CONVEYER.

SPECIFICATION forming part of Letters Patent No. 786,791, dated April 11, 1905.

Application filed May 4, 1904. Serial No. 206,388.

To all whom it may concern:

Be it known that I, JAMES M. AKERS, a citizen of the United States, residing at Gays, in the county of Moultrie and State of Illinois, have invented a new and useful Pneumatic Conveyer, of which the following is a specification.

This invention relates to that class of pneumatic conveyers which are especially constructed for and adapted to the purpose of conveying grain from a place of storage into cars or other conveying means whereby it is to be transported.

The object of the invention is to provide pneumatic conveying means whereby grains of various kinds and in various conditions may be operated upon in the most appropriate manner to bring about a successful result, one of the features being in the combination, with conveying means, of cleansing and purifying means, whereby dust and all light particles shall be extracted from the grain during the process of conveyance.

A further object of the invention is to provide within the conveying means structural features which may be conveniently adjusted for the purpose of adapting the device to the kind of material that is to be operated upon.

A further object of the invention is to provide means whereby grain may be fed to the conveyer for exceptionally-rapid conveyance, as may be sometimes made necessary by circumstances or desirable when the grain is of such a grade as to require no recleaning.

A further object of the invention is to provide the conveying means with a spout or exit device mounted for oscillation and with means for automatically oscillating said spout during the operation of the device in order that the material discharged by the conveyer shall be evenly distributed in the car or other place of deposit.

With these and other ends in view, which will readily appear as the nature of the invention becomes better understood, the same consists in the improved construction and novel arrangement and combination of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the accompanying drawings has been illustrated a simple and preferred form of embodiment of the invention, it being, however, understood that no limitation is necessarily made to the precise structural details therein exhibited, but that the right is reserved to any changes, alterations, and modifications which come fairly within the scope of the invention and which may be resorted to without departing form the spirit or sacrificing the advantages of the same.

In said drawings, Figure 1 is a longitudinal vertical sectional view of a pneumatic conveying apparatus constructed in accordance with the principles of the invention. Fig. 2 is a transverse sectional view taken on the line 2 2 in Fig. 1. Fig. 3 is a longitudinal sectional view, enlarged, of the portion of the device which includes the means for actuating the oscillatory discharge-spout. Fig. 4 is a transverse sectional view taken on the line 4 4 in Fig. 3. Fig. 5 is a transverse sectional view taken on the line 5 5 in Fig. 1. Fig. 6 is a top plan view of as much of the device as is illustrated in Fig. 3. Fig. 7 is a detail view, on an enlarged scale, of a portion of the disk 20 and related parts.

Corresponding parts in the several figures are indicated by similar numerals of reference.

This improved pneumatic conveying device includes a fan casing or housing 1, the sides of which afford bearings for a shaft 2, carrying a fan 3 of approved construction. The sides of the casing 1 are provided in the usual manner with openings 4, with one of which is connected a feed-spout 5, through which grain may be fed from the place of storage to the eye of the fan. The casing or housing 1 has a discharge-spout 6, which is connected by a passage-way 7 with the feed-spout 5, and in the latter is disposed a valve 8, which may be adjusted to cause grain fed through the spout 5 to either pass to the eye of the fan or to be deflected through the passage 7 to the inner end of the discharge-spout, as may be found most desirable and appropriate for the kind and quality of grain to be operated upon. A valve 7[a] is disposed to regulate the discharge-opening of the passage-way 7. The discharge-spout 6 of the fan-casing is disposed

at the lower front end of the same. Diametrically opposite to said discharge-spout or at the upper rear corner of the fan-casing is disposed an outlet-tube 9, which leads to a dust-bin or other suitable place of deposit for the dust and lighter materials extracted from the grain during its passage through the conveyer. Within the casing directly in front of the tube 9 is disposed a curved shield or deflector 10, and in front of said shield is a partition 11, the ends of which are spaced apart from the upper and rear sides of the casing and are provided with valves 12 and 13, adapted to coöperate with the upper and rear sides, respectively, to form closures for the passages 14 and 15 between the ends of the partition-plate 11 and the proximate parts of the casing. The direction of rotation of the fan is indicated by an arrow A. It follows that when the valves 12 and 13 are open and when grain is fed to the casing, either directly through the spout 5 to the eye of the fan or through the passage 7 to the perimeter of the fan-casing, such grain will be carried around with the fan and will be thrown violently through the opening or passage 14 and against the curved shield or deflector 10, thus dropping down through the opening 15 into the lower part of the fan-casing, where it again comes under the direct influence of the fan, whereby it is expelled through the discharge-spout 6. It will be understood that while this operation takes place currents of air will pass through the openings 14 and 15 below the lower edge of the deflector 10 and up through the spout 9. It follows that as the grain passes from contact with the deflector 10 it drops into an ascending air-current, whereby the dust and lighter particles are carried off through the spout 9, while the perfect grain will float downwardly through said ascending current until it comes once more under the direct influence of the fan, whereby it is expelled, as before stated.

It is obvious that by properly adjusting the valves 14 and 15 the operation of the device may be regulated. When grain such as oats is to be treated, which will be benefited by the strong abrasive action resulting from its being thrown forcibly against the deflector 10, such grain will be fed through the spout 5 directly to the eye of the fan, passing by the usual centrifugal action swiftly and violently to the extremities of the fan-blades, whereby it is carried around and thrown with great violence against the deflector, whereby loosely-adhering particles of husk and the like will be removed and carried off by the current ascending through the spout 9, while the oats, greatly improved by this operation, will be carried off through the discharge-spout 6. When a less-violent action is desired, the grain may be supplied to the conveyer-casing through the passage-way 7, in which a plurality of pendent valves 16 are hingedly mounted, said valves being so suspended that they will close to and prevent the upward passage of an ascending air-current, while the grain will rapidly gravitate therethrough and be finally expelled through the spout 6. When for any reason it shall be desired to convey the grain in a large volume and with the greatest degree of rapidity, the grain may be fed through the spout 9, the valve 12 being meanwhile closed. The grain will then immediately gravitate through the opening 15 and come under the direct influence of the fan, which will discharge it forcibly through the spout 6.

The discharge-spout 6 carries at the end thereof an oscillatory sleeve 17, with which are rigidly connected, as by means of rivets 18, an extension-spout 19 and an annular disk 20. Hingedly connected with the short extension-spout 19 is a longer spout 21, which telescopes within a discharge-spout 22, terminating in an elbow 23. It is obvious that the members 19 and 21 coöperate with the member 6 to constitute the complete discharge-spout of the conveyer. The hinge-joint whereby the members 19 and 21 are connected is merely for the purpose of enabling said member 21 when the device is not in use to be elevated to and suitably supported in an inactive position. The telescoping connection between the spout members 21 and 22 should be of such a nature that when the sleeve 17 and the spout members 19 and 21 are oscillated the telescoping extremity 21 shall be oscillated therewith. The object of connecting the member 22 telescopically with the member 21 is simply to enable it to be conveniently extended into or withdrawn from a car or other receptacle that is to be loaded with grain. The specific purpose of the elbow 23 will be presently understood.

The disk 20, which, as stated, is rigidly connected with the sleeve 17 and the spout member 19, is provided upon its inner face with segmental rows of teeth or cogs 25, which are preferably intersected or separated by a segmental flange 26, at the ends of which are formed additional cogs 27, obliquely disposed and intended for the purpose of assisting in guiding the pinion from engagement with the inner rows of teeth into engagement with the outer row, and vice versa, said segmental rows of teeth being disposed within a continuous guide-flange, the outer and inner sides of which, 28 and 29, are suitably spaced from the outer and inner ends of the teeth, while the ends 29 of said continuous flange are equally spaced from the end teeth 27. The extent of the segmental row of teeth and the inclosing flange is slightly in excess of one-half of the face of the disk upon which said teeth and flange are concentrically disposed.

The spout member 6 is provided with brackets or uprights 30 and 31, the former of which carries a vertically-slidable boxing 32, while the latter has a pivoted boxing 33 connected therewith, said boxes affording bearings for a shaft 34, carrying at its front end a pinion 35, engaging between the teeth of cogs 25 and the adjacent portion of the continuous flange surrounding said teeth. It will be seen that when the shaft 34 is rotated the pinion engaging, for example, the outer row of teeth 25 will cause the disk 20 to rotate until the end of the segmental row of teeth is reached. The pinion will then engage the teeth 27 and be guided over the end of the flange 26 into engagement with the inner rows of teeth 25, thus reversing the direction of rotation of the disk until the opposite end is reached, when the pinion will be restored into engagement with the outer row of the teeth, thus again causing the direction of rotation to be reversed. A continuous oscillatory motion will thus be imparted to the disk 20 and its related parts, and movement of the shaft 34 necessary to permit the pinion 35 to accommodate itself to engagement with the inner or the outer ends of the teeth or cogs 25, as the case may be, will be permitted by the vertically-slidable box 32 and the pivoted boxing 33, and it will likewise be observed that the supports 31 for the pivoted boxing 33 being located at a distance from the disk 20 the movement of the extremity of the shaft adjacent to said pivoted boxing will be infinitessimal. This is obviously important in order that movement may be conveniently transmitted to the shaft 34, which is done through the medium of bevel-gearing 35′ 36, connecting the shaft 34 with a transversely-disposed shaft 37, journaled in boxes supported by brackets 38, mounted upon the spout member 6. The shaft 37 carries a pulley 39, which may be belted directly to a suitable pulley 40 upon the main shaft 2 of the conveyer-fan. In order to support the disk 20 and related parts and to prevent the projecting spout portion from sagging, suitably-constructed bracket members 41 are connected with the spout member 6 in such a manner as to engage and support the disk 20, the sleeve 17, upon which it is mounted, and the spout members connected with said oscillatory parts. In the operation of this part of my invention it will be understood that a continuous rotary motion is imparted to the shaft 34 from the fan-shaft 2 when the latter is in operation by the intermediate gearing herein described. As the shaft 34 rotates the pinion thereon will engage alternately the outer and the inner rows of the teeth or cogs 25 and will thus impart a continuous oscillatory movement to the disk 20, sleeve 17, and the spout-sections 19, 21, and 22, connected therewith. The outer telescoping spout-section terminating in the elbow 23 being extended into a car above the grain-door of the same, it is obvious that the air and grain will be forcibly discharged into such car and that owing to the oscillation of the discharge-spout the elbow 23 will be alternately directed toward the two ends of the car, thus forcibly discharging the air and grain into the car and diffusing the grain over the entire area of the latter. Not only this, but the large quantities of air discharged which will escape through the door-openings serve to carry off any dust or impurities that may remain suspended therein, so that nothing but the pure grain shall be permitted to remain in the car. After the desired quantity of grain has been loaded into the car the grain-supply is shut off and the fan is permitted for a short period to remain in operation, thus causing all remaining impurities to be expelled from the car before the latter is closed or sealed. It will thus be seen that by this invention cars may be quickly and successfully loaded without necessity for employing manual labor for the purpose of shifting the grain in the car into which it is introduced and also that the treatment to which the grain is subjected has the effect of rendering it pure, clean, and freer from dust and objectionable matter than is ordinarily the case, thereby naturally improving the grade of the article.

Having thus described the invention, what is claimed is—

1. In a device of the class described, a fan-casing, means for inducting grain into the same, a discharge-spout for said grain, a discharge-spout for dust and lighter particles, and a deflector adjacent to the latter discharge-spout.

2. In a device of the class described, a fan-casing, means for inducting grain into the same, a discharge-spout for said grain, a discharge-spout for dust and lighter particles disposed opposite to said grain-discharge, and a partition-plate in the fan-casing spaced from the dust-discharge spout.

3. In a device of the class described, a fan-casing, means for inducting grain into the same, a grain-discharge spout, a fan supported within the casing, a dust-discharge spout, and a partition disposed between the latter and the fan and having its ends spaced from the top and the rear side of the fan-casing.

4. In a device of the class described, a fan-casing, means for inducting grain into the same, a grain-discharge spout, a dust-discharge spout, a partition disposed between the latter and the fan, the ends of said partition-plate being spaced from the top and rear side of the fan-casing, valves connected hingedly with the ends of said partition and adapted to regulate the passages between the ends of said plate and the proximate top and rear wall of the fan-casing.

5. In a device of the class described, a fan-casing, means for inducting grain into the same, a fan supported rotatively in said casing, a grain-discharge spout, a dust-discharge spout disposed diametrically opposite to the grain-discharge spout, a deflector disposed adjacent to the dust-discharge spout, and a partition supported between said deflector and the fan, the ends of said partition being spaced from the proximate top and rear wall of the casing.

6. In a device of the class described, a fan-casing, means for inducting grain into the same, a grain-exit and a dust-exit from said casing, a deflector disposed adjacent to the dust-exit, and means for throwing the grain violently against said deflector, to be thereby deflected into a current of air ascending through the dust-exit.

7. In a device of the class described, a fan-casing, a rotary fan supported upon the same, means for inducting grain into said casing, a cylindrical discharge-spout connected with said cylindrical spout, a disk connected with said extension-spout and having a segmental series of teeth surrounded by a continuous guide-flange, a shaft carrying a pinion continuously engaging, alternately, the inner and outer rows of the teeth upon the disk to impart to the latter an oscillatory movement, supporting means for said shaft, including a pivoted box, and a vertically-slidable box, the pivoted box being distant from the pinion, a bevel-pinion upon said shaft near the pivoted box, a transversely-disposed driven shaft having a bevel-gear intermeshing with said bevel-pinion, and means for transmitting power to said driven shaft from the fan-shaft.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JAMES M. AKERS.

Witnesses:
VINTERN AYR,
GEORGE KAELBERER.