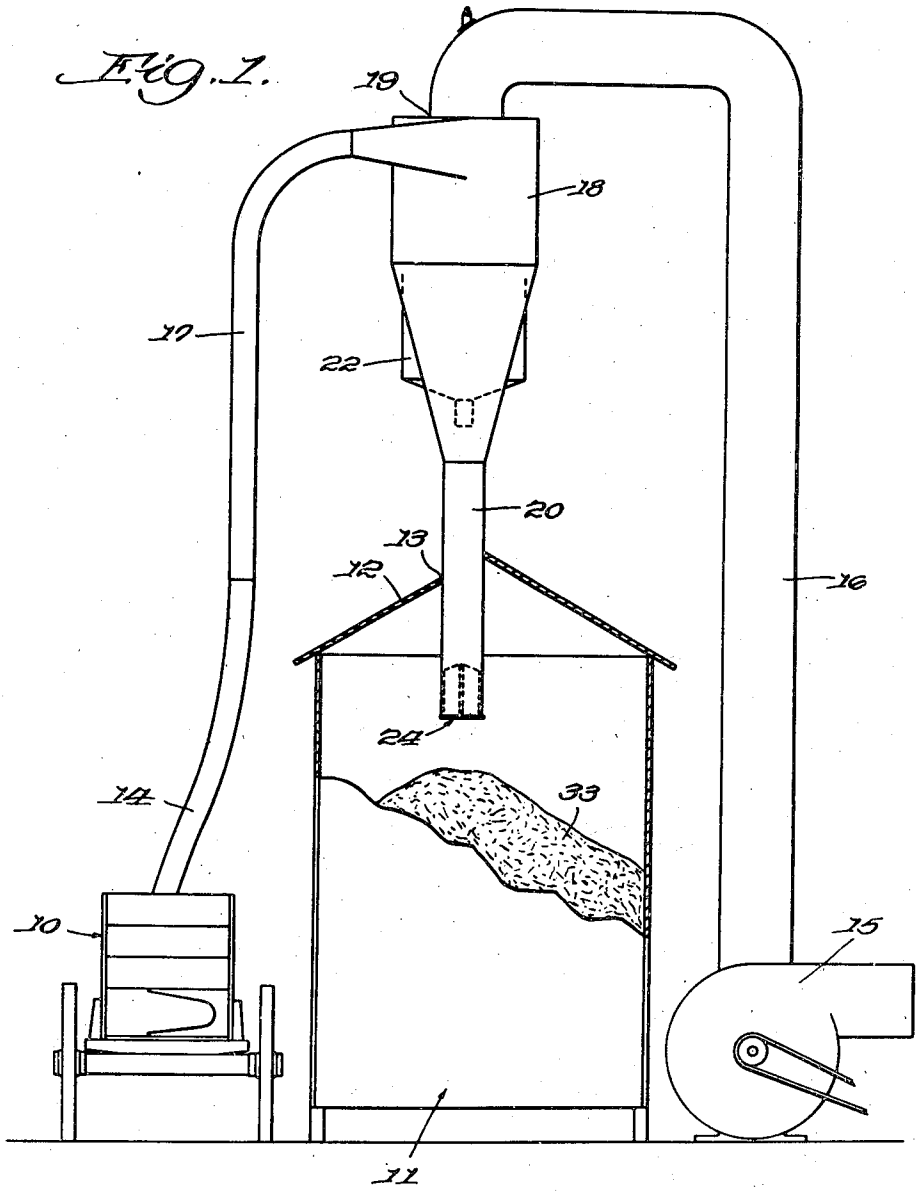
June 21, 1949. A. B. WELTY 2,474,205

PNEUMATIC GRAIN ELEVATOR

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Fig. 1.



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Fig. 2.

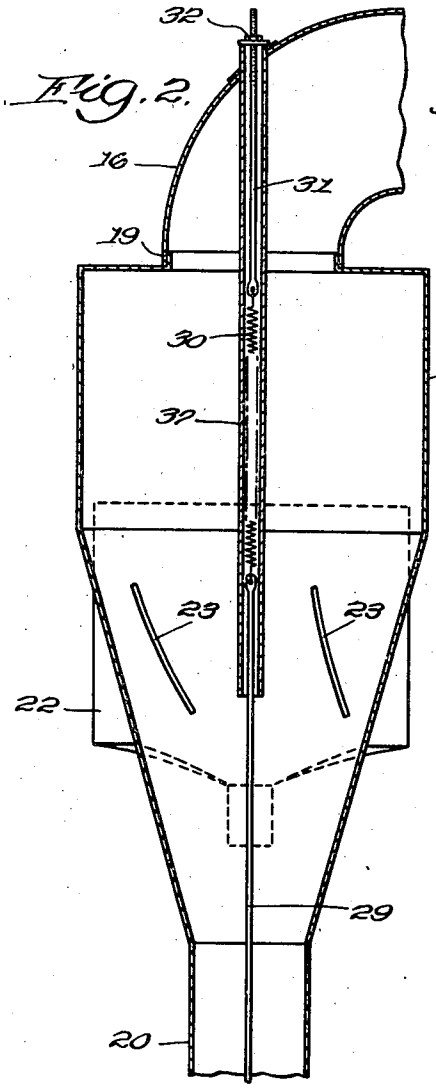


Fig. 3.

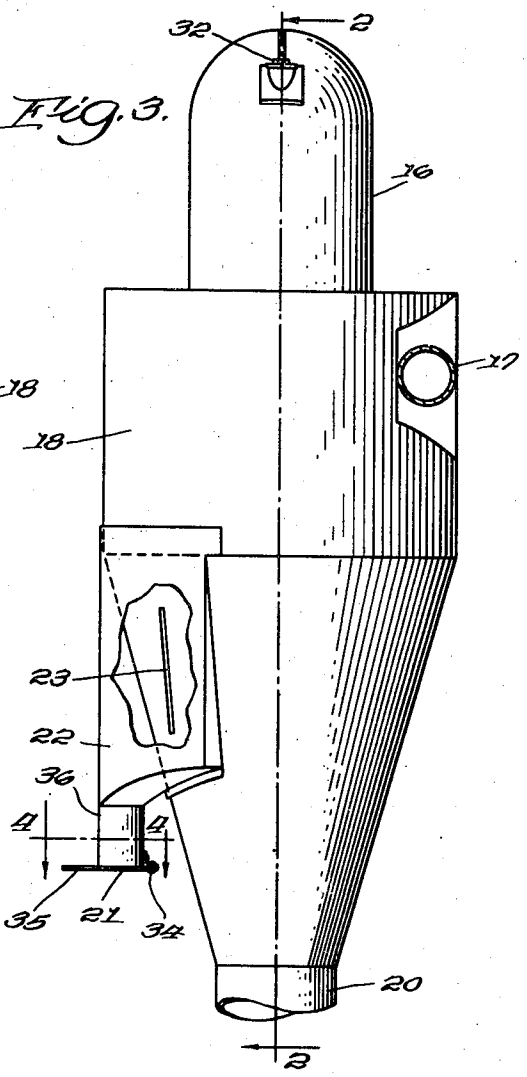


Fig. 4.

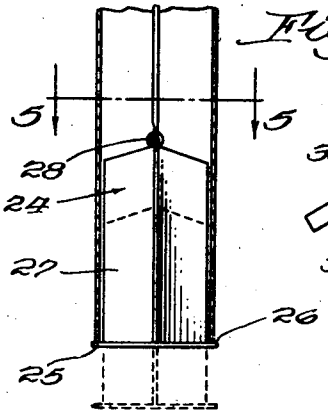
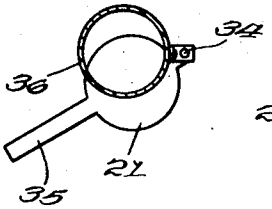
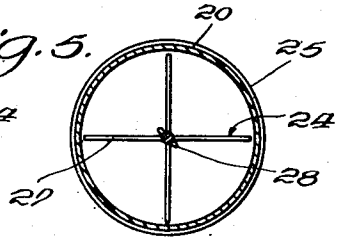


Fig. 5.





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UNITED STATES PATENT OFFICE

2,474,205

PNEUMATIC GRAIN ELEVATOR

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Application November 14, 1945, Serial No. 628,410

2 Claims. (Cl. 302—59)

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This invention relates to a new and improved pneumatic grain elevator and has for one of its principal objects the provision of means for raising grain from a low level to a relatively high level by means of suction.

An important object of this invention is to provide a grain cleaning means in combination with a pneumatic grain elevator.

Another important object of this invention is the provision of a grain discharge device located intermediate the grain to be elevated and the source of suction.

A further important object of this invention is to provide a pneumatic lifting means for grain, such as corn or rice, which has been previously loaded in a wagon by field traversing corn harvesters and harvester threshers respectively.

The pneumatic grain elevator of this invention is designed to provide a flexible elevator for unloading grain brought to storage bins by wagons or trucks. The ordinary bucket-type conveyor for unloading wagons is not fully satisfactory in that it is somewhat limited in its flexibility and further that there is no means of cleaning the grain prior to depositing it in the storage bins without putting the grain through an additional cleaning operation. The pneumatic elevator of this invention removes the grain from a wagon at a relatively low level and raises it by suction created at a distance from the wagon unloading conduit. The grain being elevated is permitted to enter an enlarged chamber within which the grain is permitted to fall downwardly, and any foreign particles such as dirt, dust, and chaff which are lighter than the grain are carried upwardly and out of the enlarged chamber by the remote source of suction. It is, therefore, an important object of this invention to provide a pneumatic elevator with an enlarged grain cleaning chamber for automatically separating grain from foreign particles.

Another and still further important object is the provision of adjustable air intake means for an enlarged grain cleaning chamber.

Still another object of the invention is to provide a grain discharge device capable of resisting passage of air and yet of discharging grain at intervals depending on the quantity of grain to be discharged.

Other and further important objects of this invention will become apparent from the following specification and accompanying drawings in which:

Figure 1 is a side elevational view of the pneumatic grain elevator of this invention shown in operating installation;

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Figure 2 is a detail sectional view of the grain cleaning and discharging device of the pneumatic elevator as shown in Figure 1 and taken on the line 2—2 of Figure 3;

Figure 3 is an elevational detail of the grain cleaning chamber of the pneumatic elevator;

Figure 4 is a sectional view taken on the line 4—4 of Figure 3; and

Figure 5 is a sectional view taken on the line 5—5 of Figure 2.

As shown in the drawings:

The reference numeral 10 indicates generally a wagon carrying grain such as rice or corn. The wagon 10 has been pulled to a position closely adjacent a grain storage bin 11. The storage bin 11 is equipped with a top portion 12 having an opening 13 through which grain or any cereal may be introduced to the storage bin.

The pneumatic elevator of this invention is equipped with a flexible conduit or nozzle 14 adapted to be inserted in the grain-filled wagon 10. A fan 15 positioned relatively distant from the wagon 10 is adapted to provide suction in the flexible conduit 14 through the intermediate connecting conduits 16 and 17. The fan 15 draws the grain from the wagon 10 up through the flexible conduit 14 and thence through the stationary conduit 17 and into an enlarged grain cleaning chamber 18.

The grain cleaning chamber 18 is joined at its top at 19 to the conduit 16 and at its bottom is provided with a downwardly depending discharge tube 20 which enters the roof 12 of the storage bin 11 at the opening 13. As best shown in Figure 3, the grain enters the cleaning chamber 18 through the conduit 17. As previously stated, the grain cleaning chamber is relatively large and acts somewhat like an expansion chamber. The suction in the conduit 17 is relatively great whereas the suction within the enlarged grain cleaning chamber has been relatively reduced by the increased volume. The reduced suction causes the grain entering the chamber to fall downwardly through the cleaning chamber to the discharge pipe 20 at the lower end thereof. The suction created by the fan 15 requires the passage of air through the conduits so that the elevator will have lifting characteristics. An absence of a supply of air to the pneumatic elevator would render the elevator inoperative. A valve 21 is provided in skirt enclosure portion 22 of the cleaning chamber 18. The skirt 22 encircles the cleaning chamber 18 and has communication with the

atmosphere only through the valve 21. Slots 23 are provided in the cleaning chamber 18 to permit passage of air from the valve 21 thrcugh the chamber formed by the skirt 22. The provision of the valve 21, the skirt 22, and the slots 23 permits air to be taken in for use by the pneumatic elevator. The first function of the air admitted is to form a suction on which the grain from the wagon 10 may be carried upwardly through the flexible conduit 14 and the stationary conduit 17. The second function of the air admitted is to assist in the removal of foreign matter, such as chaff and dirt, from the grain.

When the grain from the wagon enters the cleaning chamber 18 it is sufficiently heavy to drop through the enlarged chamber due to the decreased suction and passes right down over the slots 23 to the downwardly depending discharge member 20. The air drawn in through the valve 21 and the slots 23 passes upwardly through the cleaning chamber 18 and then through the conduit 16 to the fan 15. Although the suction has been reduced so that it is not sufficiently strong to remove grain upwardly through the chamber 18, it does have sufficient force to remove any foreign lighter particles than the grain, and as a result the grain is very efficiently separated from chaff and the dirt.

The suction created by the fan 15 has its air intake regulated by the valve 21. The discharge conduit 20 extending downwardly from the cleaning chamber 18 also provides an opening to the atmosphere which if not stopped would completely offset the value of the regulated air supply by the valve 21 and further would tend to remove grain previously deposited in the discharge pipe 20 and draw it back up into the cleaning chamber 18. Hence a means is provided so that a column of grain sufficiently great in depth to prevent passage of air therethrough is maintained in the discharge pipe 20 at all times. This means takes the form of a resiliently held receptacle 24. The receptacle 24, as best shown in Figures 2 and 5, is provided with a bottom 25 adapted to act as a valve and to close against an annular seat 26 at the bottom end of the discharge tube 20. The receptacle 24 is equipped with a cross-shaped body portion 27 rigidly attached to the bottom plate 25 and extends upwardly within the discharge tube 20. This cross-shaped body portion 27 is not enclosed around its periphery but rather is open to permit grain within the discharge tube 20 to fall outwardly from the receptacle 24 when the receptacle has dropped to a position shown in dashed lines in Figure 2. A hook 28 is fixed to the upper end of the receptacle 24 and joins with an upwardly extending rod 29 in turn attached to a spring 30 which is attached at its upper end to a rod 31 adjustable with respect to the cleaning chamber 18 and the conduit 16 by means of a nut 32. The spring 30 causes the valve or bottom plate 25 to seat against the discharge tube 20 of the cleaning chamber 18 with a force regulated by the adjustment nut 32. For ordinary use the spring is adjusted so that it will support a column of grain in the receptacle 24 which reaches substantially to the cleaning chamber 18. As soon as more clean grain falls on the formed column of grain, the weight of the grain becomes sufficient to overcome the upward force exerted by the spring 30 and the receptacle 24 drops to the position as shown in the dashed lines in Figure 2. A portion of the grain forming the lower part of the column is discharged and drops into a pile

of grain 33 in the grain receptacle 11. Just as soon as the column of grain is diminished to a point where its weight is less than the upward action of the spring 30, the spring causes the closing of the receptacle bottom 25 against the seat 26 provided on the under side of the discharge tube 20. This unique construction prevents air from being drawn in through the discharge tube 20 as the column of grain retained therein is sufficient to block passage of any air, and hence the valve 21 as best shown in Figures 3 and 4 completely controls the amount of air admitted to the pneumatic elevator of this invention.

The valve 21, as shown in Figure 4, has a plate valve slidable horizontally about a hinge 34 by means of a handle 35. The valve 21 acts to regulate the amount of air admitted to a circular tube 36 forming an entrance to the chamber enclosed by the skirt 22.

In operation, grain is elevated from a wagon or the like through the flexible conduit 14 and the stationary conduit 17 and thereupon into the cleaning chamber 18 in which the grain drops downwardly to the discharge tube 20. The dirt and other foreign matter lodged in the grain is carried upwardly and thence downwardly and out through the conduit 16. The admission of air to this pneumatic elevator is accomplished through the valve member 21 which permits an adjustable quantity of air to enter the enlarged cleaning chamber. The grain in the discharge tube 20 eventually overcomes the upward action of the spring 30 which is positioned within a tubular housing 37, at which time a portion of the grain in the discharge tube 20 is permitted to exit at the bottom thereof.

Numerous details of construction may be varied throughout a wide range without departing from the principles disclosed herein, and I do not propose limiting the patent granted hereon otherwise than as necessitated by the appended claims.

What is claimed is:

1. A pneumatic grain elevator having a grain engaging conduit, a source of suction, a suction conduit joining said source of suction to said grain engaging conduit, an enlarged chamber in the suction conduit intermediate the source of suction and the grain engaging conduit, means for discharging grain from said enlarged chamber, said means including an open sided receptacle having a bottom plate larger in cross section than the open sided portion, said enlarged chamber having an aperture in the bottom thereof for receiving the open sided receptacle, the large bottom of the receptacle adapted to fully close said aperture when in its uppermost position, an adjustable yieldable suspension means for said receptacle normally holding said receptacle in its uppermost and aperture closing position and adapted to yield downwardly upon a quantity of grain reaching some predetermined weight within the receptacle, said suspension means comprising a hook on the top of the receptacle, a rod hooked thereto and extending upwardly, a spring attached to said rod, and a rod on the other side of said spring and having threads along its upper end, said rod extending through said suction conduit and having a nut threadedly engaging said rod on the outside of said conduit for up or down adjustment and a direct change in spring tension.

2. A pneumatic grain elevator having a grain engaging nozzle, a suction fan, a conduit join-

ing said fan and said grain engaging nozzle, whereby a suction is applied at the contact of the nozzle with the grain, an enlarged chamber positioned in the conduit as a part thereof, means for discharging grain directly from said enlarged chamber, said means including a downwardly depending tube from said enlarged chamber and having an opening in the bottom thereof, a grain supporting receptacle slidable upwardly within said tube, said receptacle including a bottom plate adapted to engage the underside of the discharge tube and to limit upward sliding of the receptacle within the tube, a cross-shaped body portion rigidly attached to said bottom plate and having a width slightly less than the diameter of the tube for vertical sliding movement of the cross-shaped body in the tube, said receptacle bottom plate adapted to fully close the enlarged chamber when in its upper tube engaging position, and tension adjustable spring means for normally yieldably holding said receptacle in its up, chamber closing position, said receptacle

automatically lowering upon the grain therein becoming sufficiently heavy to overcome the upwardly exerting spring means and to thereupon discharge said grain from said cross-shaped body portion.

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