June 24, 1941. L. DELIVUK 2,246,723

COMBINED ELEVATOR AND PNEUMATIC GRAIN CLEANER

Filed April 10, 1939 2 Sheets-Sheet 1

Fig. 1.

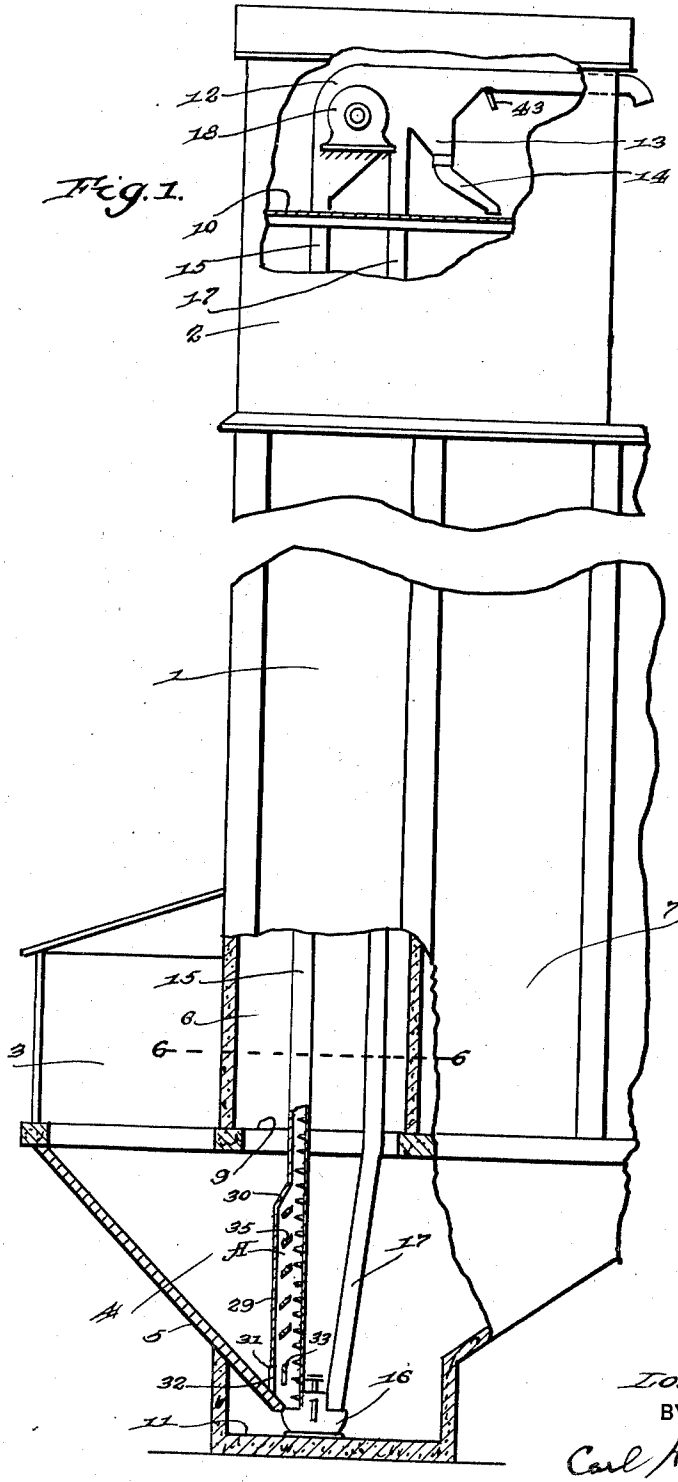
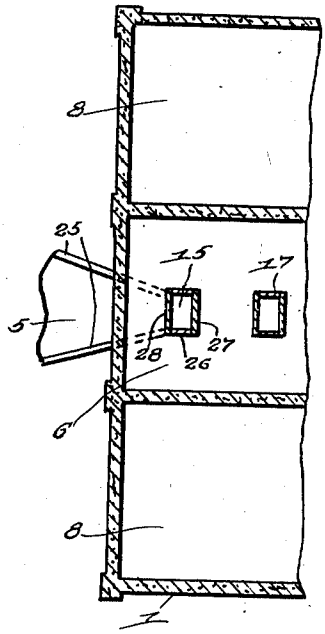


Fig. 6



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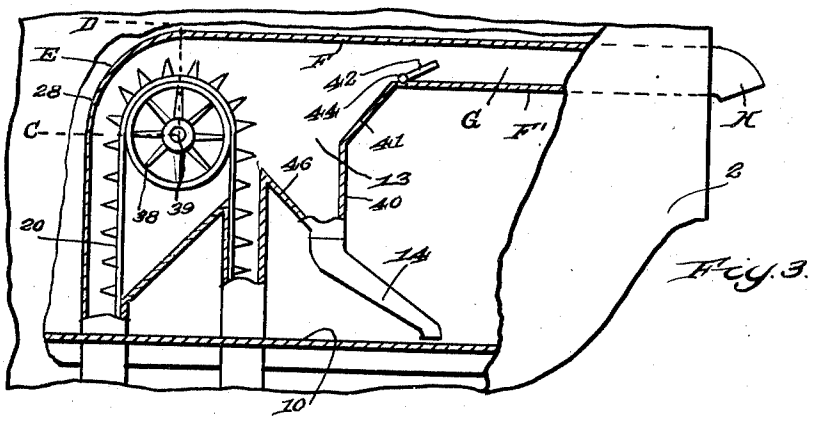


Fig. 3.

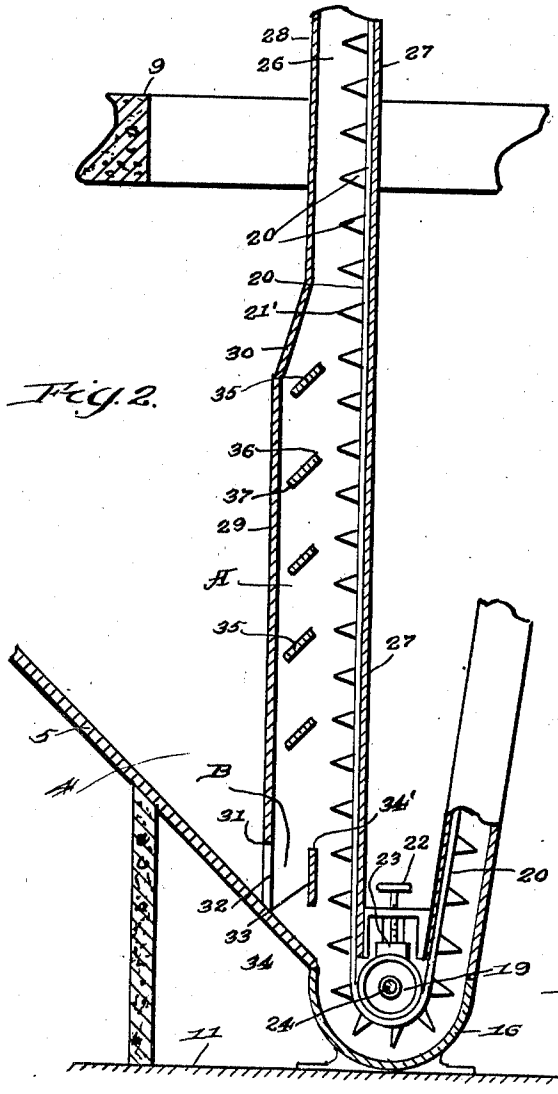


Fig. 2.

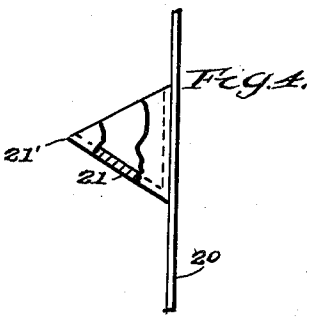
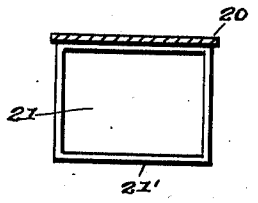


Fig. 4.

Fig. 5.



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UNITED STATES PATENT OFFICE

2,246,723

COMBINED ELEVATOR AND PNEUMATIC GRAIN CLEANER

Louis Delivuk, Spokane, Wash.

Application April 10, 1939, Serial No. 267,033

10 Claims. (Cl. 209—147)

This invention relates to improvements in mechanism for elevating grain in grain elevators.

One of the objects of this invention is to provide a grain elevator leg mechanism that will preclean the grain before it reaches the distributor spout hopper in the spout house, and whereby the dust ladened air resulting from the cleaning operation will be conveyed off by a refuse pipe in such a manner as to leave the grain clean when it is discharged into the distributor spout hopper.

A further feature resides in a means whereby the dust ladened air discharged from the elevator leg will be discharged outside the spout house into the outer air.

A further feature resides in a novel means whereby the dust ladened air will be centrifugally released or discharged in such a manner that it will take a natural or least resistance course from the point at which it is released, to the path of travel which is afforded, from the point of release.

It is a feature of the invention to provide a deflecting or arresting wall, a part of which is adjustable, whereby the lighter grain thrown beyond the spout hopper will be arrested and guided back into the spout hopper.

A very important part of the invention resides in a non-choking feature which is achieved by a novel grain ingress to the elevator leg which, at the opening thereof, is unobstructed, but which, inside the opening, relative to the direction of flow of the grain therethrough toward the buckets, is provided with a grain retarding means which effectively arrests the tendency of the grain to choke at the point of intake, and prior to movement of the grain into the buckets.

A feature of major importance resides in a pre-cleaning or excess grain chamber with which the elevator leg is provided and which chamber is equipped with devices that guide the excess grain released from the buckets in a direction so that such grain will descend onto and check the incoming grain flowing through the ingress opening, in a manner to coact with and supplement the action of the retarding means in arresting objectionable choking of the grain at the ingress opening.

The devices with which said chamber is equipped are preferably in the form of baffles, and are so disposed and located that, in addition to the guiding feature which is performed by the upper faces of said baffles, the lower faces thereof perform the additional function of arresting excess grain that is thrown upwardly from the ascending buckets, thereby serving to scatter the grain and cause part of the same to descend upon the next lower baffle and other parts to fall indiscriminately into the lower portion of the chamber.

A special feature of this pre-cleaning chamber is that it is enlarged with respect to the normal cross sectional portion of the elevator leg and functions to prevent congestion which is one of the primary reasons for choking.

As a result of the features of this invention, it is possible to impart a speed to the buckets of such a great acceleration as compared to the usual speed, that the buckets will generate a positive high pressure current of air upwardly, not only in the chamber but throughout the length of the elevator leg, in such a manner that practically all the dust and chaff will be picked up and carried upwardly by this air current so that when the grain is finally discharged downwardly into the distributor spout hopper, it will be cleaned to a far greater extent than has heretofore been possible.

The invention has many other objects and features which will be more fully described in connection with the accompanying drawings and which will be more particularly pointed out in and by the appended claims.

In the drawings:

Fig. 1 is a longitudinally contracted view in elevation, with parts broken away, showing the application of the device of my invention to a grain elevator.

Fig. 2 is an enlarged sectional view of a portion of the elevator leg showing the pre-cleaning and excess grain chamber together with the ingress opening.

Fig. 3 is a view of the spout house on top of the elevator, with parts broken away, to show the manner in which the dust ladened air is conveyed off to the outer atmosphere.

Fig. 4 is a view in side elevation of one of the buckets with a part broken away.

Fig. 5 is a plan view thereof.

Fig. 6 is a horizontal sectional view on line 6—6 of Fig. 1.

Like characters of reference designate similar parts throughout the different figures of the drawings.

As shown in the drawings, 1 indicates a grain elevator structure with a distributor spout house 2 disposed on top of the same. A runway for the trucks is indicated at 3 and a grain pit at 4, into which the grain is dumped from the runway 3. The bottom wall 5 of the pit is inclined to feed the grain by gravity to the elevator leg which will be presently described. The machinery well

of the elevator is indicated at 6, and the grain bins at 7 and 8. The work floor is shown at 9, and the distributor floor at 10. Below the work floor is the usual pit base 11. In the spout house 2 I have shown a housing 12 for the head pulley, to be later described, the same having a spout hopper 13 from which a distributor spout 14 extends. An elevator leg 15 extends upwardly in the machinery well 6, from a boot 16, to the housing 12, and a return leg 17 extends downwardly in well 6, from housing 12 to boot 16. An endless belt, provided with buckets, travels the endless course provided by said legs 15 and 17, and the boot 16 and housing 12. I have indicated at 18 an electric motor for driving the head pulley, but have not specifically shown the driving connection as that forms no part of the invention. However, any form of motor may be used, and in practice I shall equip such motor with a back stop so that the belt cannot reverse its travel in the even of an emergency stoppage of the motor, as a reversal of travel of the belt and its buckets would cause a serious choking of the elevator leg, as will be clear to those skilled in the art.

Reference will next be made to what constitutes the various improvements of my invention for grain elevators, and where ever I have referred to grain elevators, it will be understood that I use the phrase generically, to include elevators that handle rice, coffee or like goods.

Reference will next be made to the pre-cleaning and non-choking features of the invention which are more particularly illustrated in Fig. 2.

The boot 16 is of the usual form and includes a boot pulley 19, for the lower bight of the bucket belt 20 on which elevating buckets 21 are mounted in the usual way. In Figs. 4 and 5 I have shown enlarged views of the bucket which is shaped to discharge with the greatest possible facility to thereby conform to the high speed requirements of my invention. However, I do not claim the bucket, per se, but only in the combinations set forth in the claims.

Reverting to the boot 16, the same is shown provided with the usual belt tightener which is generally indicated at 22, and 23, and in which the shaft 24 of the boot pulley 19 is journalled. The return leg 17 junctures with the boot 16 in the usual manner. I have shown the shape of the legs 15 and 17 in cross section in Fig. 6, and in this figure I have shown how the pit chute, including the bottom wall 5, converges toward the leg 15 to deliver the grain thereto by gravity, the side walls of the pit chute being indicated at 25. It will be understood that these legs 15 and 17 are essentially tubular in cross section and that the term "leg", wherever used, is intended to mean an elongated tubular body that encloses the belt, and also encloses the grain when the latter is being elevated in leg 15.

Reference will now be made to the elevator leg 15, the same having side walls 26, a back wall 27, and a front wall 28. Near its lower or ingress portion, said leg 15 is enlarged, in cross section, for a sufficient distance to form what I will term an excess grain or pre-cleaning chamber A. This enlargement is effected, as shown, by spacing the front wall 29 of said chamber a greater distance from the back wall 27, as compared with the normal or remainder of the front wall 28 above said chamber, said wall 29 sloping toward and joining the front wall 28, as indicated at 30. The lower end of back wall 27 junctures with the egress side of boot 16, as shown, but said front wall 29 terminates at 31 above the pit wall 5 to form an ingress opening 32, which is the full width of leg 15. The side walls 25 of the pit converge so that the terminal of the pit is the same size as said ingress opening 32, as will now be clear. It may also be stated that the width of leg 15 is uniformly the same throughout the length of said leg, inclusive of the pre-cleaning chamber so that I can use the normal width belt and bucket.

It is a special feature of this invention to provide an ingress opening that is wholly unobstructed as far as the opening itself is concerned, and wherein the usual adjustable gate is not necessary. Thus it will be seen from Fig. 2 that throughout the thickness of wall 29, and for a slight distance inside the actual opening 32, the grain will have an unobstructed flow.

However, inside of said opening, that is with respect to the direction of flow of the grain into said chamber A, I provide retarding means for preventing such a rush of grain toward the buckets 21 as might act to choke the device.

In the form shown this retarding means consists of a vertically disposed baffle 33, which may be secured to the side walls 26 of the leg, and which is disposed in spaced relation from the tip ends 21' of the buckets 21, and rearwardly inside the opening 32. It is important that this baffle at its lower edge 34 be high enough not to arrest the flow of grain downwardly along the inclined pit bottom 5, and freely into the ascending buckets, which of course almost instantly fill as they leave the boot 16 and enter the chamber A. Thus, after the buckets have been loaded, and ascend to a position abreast of the adjacent face of the baffle 33, the latter will arrest further movement of the grain toward the buckets. Further, the baffle 33 is shown with its upper edge 34' about on a horizontal line with the upper edge of opening 32, and this baffle is disposed far enough inside front wall 29 so as to form a space indicated at B, into which grain can descend upon and check the flow of ingressing grain flowing through opening 32, as will later appear.

Above baffle 33 the chamber A is provided with a series of grain guiding and scattering devices which, in the drawings, are in the form of baffles, and as all are identical in form and function they will be given the same reference numerals.

These guiding baffles are indicated at 35 and are shown inclined downwardly from the buckets 21, toward the front wall 29, and the upper edges 36 are in free clearance relation to the tip ends 21' of the buckets while the lower edges 37 are in clearance relation from the inside of front wall 29, the clearance last named being less than the first named clearance. Said baffles 35 may be anchored to the side walls 26 of leg 15 in any desired manner. As there is always an excess of grain resulting from over-filled buckets, some grain will, because of the usual agitation of the rapidly ascending belt, fall onto or be discharged against the upper faces of said baffles 35, and such grain will be guided and discharged toward and will fall along the inside of wall 29, down into space B and onto the flow of ingressing grain. Further, some excess grain will be thrown upwardly by the buckets against the lower faces of baffles 35, and part of this grain will be scattered indiscriminately, some falling on the upper face of the next lower baffle, and some descending between the inner edges 36 and the buckets. However, all of this excess grain will be subject to the high pressure current

of air in chamber A, and throughout the length of leg 15 whereby the dust and chaff will be carried upwardly in said leg. Of course a most effective and major part of the pre-cleaning will be achieved in the chamber A, and it is within the scope of my invention to provide such elongated chamber of any desired length.

Reference will next be made to the manner in which the dust ladened air is discharged from leg 15.

As shown in Fig. 2, the belt 20 is trained over a head pulley 38, mounted on shaft 39, which is suitably connected to be driven by the motor 18, or any other desired source of power. The front wall 28 is shown as having an increasing spaced relation from the buckets 21, from dotted line C to dotted line D, thereby forming what I will term a quadrant or segment which I will designate at E. This increasing enlargement affords an accelerated centrifugal escape action on the dust ladened air due to movement of the buckets and greatly facilitates an efficient escape of the dust ladened air and also serves as perfectly to separate the same from the grain, at the discharge terminal in the spout house. From line D said wall is continued and may be designated at F, and extends in a substantially horizontal direction through the spout house. Of course it is not essential that this wall F extend in a horizontal direction.

However, it is important to note that this wall F is disposed above and in fact forms the top wall of the spout hopper 13, so that the dust ladened air will always pass above said hopper. At the right of said hopper 13 said wall F forms, with a wall F', a refuse pipe G which extends outwardly through the spout house to discharge the dust ladened air at H into the outer air, thereby leaving the interior of the spout house free from dust and chaff. It will be seen that said refuse pipe G extends tangentially from the quadrant E, with respect to the path of travel of the air discharging from said quadrant, which disposition greatly facilitates the discharge of said air.

The front part 40 of hopper 13 has a deflecting or guiding section 41 which connects the hopper with pipe G, so that when light weight grain is thrown from the buckets to points above the hopper proper, this deflecting section 41 will arrest such grain and guide it back and downwardly into the hopper. I also provide an adjustable gate 42 in pipe G, with an exterior lever 43 for adjusting said gate. Said gate may be hinged at 44 and may be adjusted upwardly as shown to arrest lighter grain that may be thrown into pipe G, and which will guide such grain downwardly, as will now be clear, but which may also be adjusted to a substantially flat position.

It will be clear that the grain discharged from the buckets 21, as they turn about pulley 38, will be thrown in a general downward and outward direction toward wall 40, and over the inclined wall 46 toward and into spout 14, it being of course understood that the hopper will hold a considerable surplus of grain beyond which the spout cannot accommodate. This fact is now brought out to further emphasize the fact that the dust ladened air passes wholly above the grain, as will now be clear.

A most important feature of the invention, and which in combination with the structure heretofore described I obtain pre-cleaning and non-choking advantages, is that I drive the belt at an accelerated speed such as to propel a high pressure current of air upwardly throughout the height of said leg 15, this speed of travel being substantially seven hundred feet per minute. With approximately this speed of belt travel I obtain an air displacement by the buckets of substantially eighty two thousand and eight hundred cubic inches per minute. This not only very greatly increases the capacity of the elevator, but it also cleans the grain and separates the dust ladened air therefrom, and because of the structure defined, it enables me to maintain such high capacity and thereby avoid choking at the intake.

As a basis of comparison, it may be stated that prior to this invention the maximum practical speed of a bucket belt in an elevator leg was substantially four hundred linear feet per minute, and even this speed, which was about fifty feet per minute above the normal speed of three hundred and fifty feet per minute, was sought and obtained merely to increase the capacity of the belt.

One of the principal causes of choking near the leg intake was the congestion resulting from discharge of grain from over-filled buckets filling the space between the buckets and the walls of the elevator leg and causing clogging. With my improved enlargement of the elevator leg at and for a suitable distance above the ingress opening, I provide enough excess space for grain discharged from the buckets to prevent congestion, and I consider this an important feature which, itself and alone, and apart from the baffles, would be an effectively operable feature of great advantage. It will be clear that the major discharge from the buckets, of excess grain that overfills the buckets, and grain that is discharged from agitation, will always occur near the lower end portion of the elevator leg, as after such initial discharge has been made, the buckets will retain the remainder of the grain therein.

While the operation may be clear from the foregoing description, it will be briefly recapitulated as follows:

Wheat is dumped by truck loads into the pit 4 and there is practically always a grain level above opening 32, of a greater or less extent, so that there is always a surplus of grain seeking by gravity to enter said ingress opening.

It is desired to emphasize the fact that grain is delivered to the pit in widely different degrees of condition. Some is full bodied and plump, in which event choking is less likely to occur, but when grain is lean and saturated with weed particles, or damp, or excessively dry, choking at the ingress opening 32 is far more likely. Further, with grain in different conditions, the buckets either over-fill or fail to fill, and in the former event choking often occurs while in the former case capacity is accordingly reduced, and both are highly objectionable, as those skilled in the art well know.

With ingress opening 32 wholly unobstructed by a gate, the grain tends to rush in at the maximum capacity of said opening. However, this inrush is blocked partly by baffle 33 so that to a large extent, ascending buckets cannot overfill to any objectionable extent, as those buckets below the lower edge 34 will efficiently fill and as they rise abreast of and behind baffle 33, further ingress is shut off as the baffle is so located that the grain cannot and will not pass over the upper edge 34' of said baffle. All the foregoing is true, irrespective of the condition of the grain that is being delivered. The foregoing

non-choking structure is operable to advantage independently of other non-choking features, but works to greater and more interdependent advantage in combination with the other features.

As the buckets ascend in chamber A, above opening 32, the rapid travel and agitation to which the buckets are subjected incident to their rapid ascent, causes some discharge of grain therefrom, either when the buckets are level or over-filled, or when only partly filled, and I will next explain how this discharged grain is utilized effectively to not only check the inflow of grain through opening 32, but to check it with the grain that is in precisely the same condition as the grain entering said opening.

As the grain drops from the buckets, some grain will fall onto the top faces of baffles 35 and all such grain will be guided toward front wall 29, and will collectively fall near such wall because of the guiding function of successively lower baffles. Thus, this portion of the grain will descend into space B directly on to the incoming grain flowing through opening 32, and will serve to check the flow thereof, and thereby arrest any tendency of the grain to choke. Even those particles of grain thrown upwardly from the ascending buckets, that are arrested by the lower faces of baffles 35, will partly descend on the upper faces of the next lower baffles, and be guided toward wall 29 as heretofore described. However, the excessive agitation to which the buckets are subjected will cause some of the grain to be discharged from the buckets and fall between the latter and the baffles 35. In any event, all the descending grain will be subjected to the powerfully propelled upward pressure current of grain cleaning air throughout the height of leg 15 in such a manner that it will be effectively separated from the dust and chaff, both of which latter will be carried upwardly in the elevator leg, as throughout the length of the latter a cleaning action is maintained.

Thus it will be seen that before the discharged grain actually engages either the upper or lower faces of baffles 35 it is scattered indiscriminately and subjected to the air current before it is effectively guided into a prescribed path of descent, and the grain that is thrown up against the bottom faces of said baffles and bounces off is likewise effectively scattered. Further, these baffles 35 also function to cause such a diversification of the air travel, as the air current successively engages and is deflected by these baffles, that the ascending air itself is forced to take circuitous courses of travel and will therefore play most effectively on the grain sliding downwardly on the upper faces of said baffles, in addition to its play upon grain taking a different falling course. Thus the baffles 35 function as both air and grain deflectors and grain guides.

Thus, in addition to the effective work of the baffles, it will be seen that it is due to the enlargement of chamber A that the grain is permitted to take such a wide range of descent in the freest and most unrestrained manner, hence no choking of grain in the chamber can possibly occur because of the free space afforded not only in the enlarged cross section but because of the elongation of the chamber.

It will be clear that the pre-cleaning chamber A is formed by cross sectionally enlarging the leg 15, with respect to the remaining cross section of the latter, for a sufficient distance upwardly from the ingress opening 32, to enable this chamber A to perform the desired pre-cleaning function. It is also an important feature to make the cross sectional enlargement transversely of the width of the leg 15, that is, by increasing the width of the side walls 26 throughout the height of the chamber A, in order that a stock belt with the usual size buckets may be used.

While it is possible to dispose of the dust ladened air in a manner not shown, still there is an intimate coaction between the low resistance egress of such air by my improved refuse pipe that greatly assists the pressure current in the elevator leg by reason of the low resistance egress means.

It will be noted that the enlarged pre-cleaning chamber A, is of course always full of the upwardly travelling air and when this high speed current reaches the restriction formed by the inclined wall 30, that joins the chamber A with the normal cross section of the leg, there will be imparted to this high speed air current an added impulse of acceleration which is of great value in the pre-cleaning operation. It will also be clear that the means for scattering excess grain from the ascending buckets, which may take the form of the baffles 35, is also of great value in subjecting the grain to a widely varying movement while it is exposed to the ascending air current.

While I have herein shown and described one specific form of the invention, I do not wish to be limited thereto except for such limitations as the claims may import.

I claim:

1. An air discharge means for grain elevators, comprising a housing having a relatively lower spout hopper and a relatively upper refuse pipe, a head pulley journalled in said housing, a belt trained over said pulley and having grain buckets adapted to discharge grain in a downward direction into said hopper, said housing having an air release quadrant of gradually increasing radii to afford an accelerated centrifugal action on the dust ladened air due to movement of the buckets for discharging said air into said refuse pipe, said refuse pipe extending tangentially from the circular path of travel of the dust ladened air through said quadrant, and a grain arresting and guiding wall extending from said pipe to said hopper for guiding lighter grain down into said hopper.

2. An air discharge means for grain elevators, comprising a housing having a spout hopper and a refuse pipe, a head pulley in said housing, a belt trained over said pulley and having grain buckets adapted to discharge grain into said hopper, and said housing having an air release quadrant of gradually increasing radii to afford an accelerated centrifugal discharge action on the dust ladened air due to rapid travel of said buckets for discharging said air toward said pipe, said refuse pipe extending tangentially from the circular path of travel of the dust ladened air through said quadrant.

3. In a high speed pre-cleaning elevator mechanism, a grain elevator having elevating means including elevator and return legs with an endless belt having buckets and being trained over head and boot pulleys and travelling in said legs, and said elevator leg having an ingress opening for the grain near its lower end, said elevator leg being cross sectionally enlarged from the remainder of its cross section a sufficient length upwardly from said opening to form an elongated chaff and dust separating chamber to af-

ford descent therein of excess grain from ascending buckets, and means for driving said belt at an accelerated speed to cause said buckets to propel a high pressure forced current of grain cleaning air upwardly in said elevator leg throughout the height of the latter to carry off dust and chaff.

4. In a high speed pre-cleaning elevator mechanism, a grain elevator having elevating means including elevator and return legs with an endless belt having buckets and being trained over head and boot pulleys and travelling in said legs, and said elevator leg having an ingress opening for the grain near its lower end, said elevator leg being cross sectionally enlarged from the remainder of its cross section a sufficient length upwardly from said opening to form an elongated chaff and dust separating chamber to afford descent therein of excess grain from ascending buckets, means for driving said belt at an accelerated speed to cause said buckets to propel a high pressure forced current of grain cleaning air upwardly in said elevator leg throughout the height of the latter to cause dust and chaff to ascend therein, and means open to and connected with the upper end of said elevator leg for discharging the ascending dust and chaff into the open air outside said elevator.

5. In a high speed pre-cleaning elevator mechanism, a grain elevator having elevating means including elevator and return legs with an endless belt having buckets and being trained over head and boot pulleys and travelling in said legs, said elevator leg having an ingress opening for the grain and being cross sectionally enlarged from the remainder of its cross section a sufficient length upwardly from said opening to form an elongated chaff and dust separating chamber to afford descent therein of excess grain from ascending buckets, said chamber having grain scattering baffles therein for scattering the descending grain, means for driving said belt at an accelerated rate of speed to cause said buckets to propel a high pressure forced current of grain cleaning air upwardly in said elevator leg and through the scattered grain in said chamber to separate the dust and chaff from the grain and cause ascent of the dust and chaff upwardly in said elevator leg, and means open to said leg for permitting the discharge of the separated dust and chaff from the upper end of said elevator leg.

6. In a high speed pre-cleaning elevator mechanism, a grain elevator having a housing provided with a spout hopper, a head pulley in said housing, elevator and return legs opening at their upper ends into said housing, a boot pulley at the lower ends of said legs, an endless belt trained about said pulleys and travelling in said legs and having buckets adapted to discharge grain into said hopper, said housing having an air release quadrant disposed peripherally about said head pulley and gradually enlarged whereby centrifugal action initiated by said buckets will increase the volume of discharge of dust ladened air, a refuse pipe extending tangentially from the circular path of travel of the dust ladened air through said quadrant, said elevator leg having an ingress opening near its lower end and being enlarged upwardly from said ingress opening to form an elongated separating chamber, and means for driving said belt at an accelerated rate of speed to cause said buckets to generate a high pressure current of air upwardly through said elevator leg and its chamber and through said quadrant.

7. In a high speed pre-cleaning elevator mechanism, a grain elevator having a housing provided with a spout hopper, a head pulley in said housing, elevator and return legs opening at their upper ends into said housing, a boot pulley at the lower ends of said legs, an endless belt trained about said pulleys and travelling in said legs and having buckets adapted to discharge grain into said hopper, said housing having an air release quadrant disposed peripherally about said head pulley and gradually radially enlarged whereby centrifugal action initiated by said buckets will increase the rate of discharge of dust ladened air, a refuse pipe extending tangentially from the circular path of travel of the dust ladened air through said quadrant for conveying said dust ladened air out of said elevator, said elevator leg having an ingress opening near its lower end and being cross sectionally enlarged compared to its remaining cross section upwardly from said ingress opening to form an elongated separating chamber, spaced members in said chamber for scattering the grain through the ascending air, and means for driving said belt at an accelerated rate of speed to cause said buckets to propel a high pressure forced current of air upwardly throughout the height of said elevator leg and its chamber and through said quadrant.

8. In a pre-cleaning apparatus for grain elevators, a tubular elevator leg substantially vertically disposed, and a belt having buckets ascending in said leg, and a lower portion of said leg being cross sectionally enlarged with respect to the remainder of said leg and for a sufficient distance to form an elongated pre-cleaning chamber.

9. In a pre-cleaning apparatus for grain elevators, a tubular elevator leg substantially vertically disposed, and a belt having buckets ascending in said leg, at an accelerated speed to propel a high speed forced current of grain cleaning air upwardly in said leg, and a lower portion of said leg being cross sectionally enlarged with respect to the remainder of said leg for a sufficient distance to form an elongated pre-cleaning chamber, the upper portion of said chamber forming a restriction at its juncture with the remainder of said leg to impart an added impulse of acceleration to said high speed air current, and said chamber having a grain ingress opening near its lower end.

10. In a pre-cleaning apparatus for grain elevators, a tubular elevator leg substantially vertically disposed, a belt having buckets ascending in said leg at an accelerated speed to propel a high speed forced current of grain cleaning air upwardly in said leg, the lower portion of said leg being cross sectionally enlarged with respect to the remainder of said leg for a sufficient distance to form an elongated pre-cleaning chamber, and means in said chamber for scattering grain discharged from ascending buckets, and said chamber having a grain ingress opening near its lower end.

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