Sept. 16, 1924. 1,508,682

R. L. DOWDALL

DEVICE FOR REMOVING DUST FROM GRAIN ELEVATORS

Filed Sept. 15, 1923 2 Sheets-Sheet 1

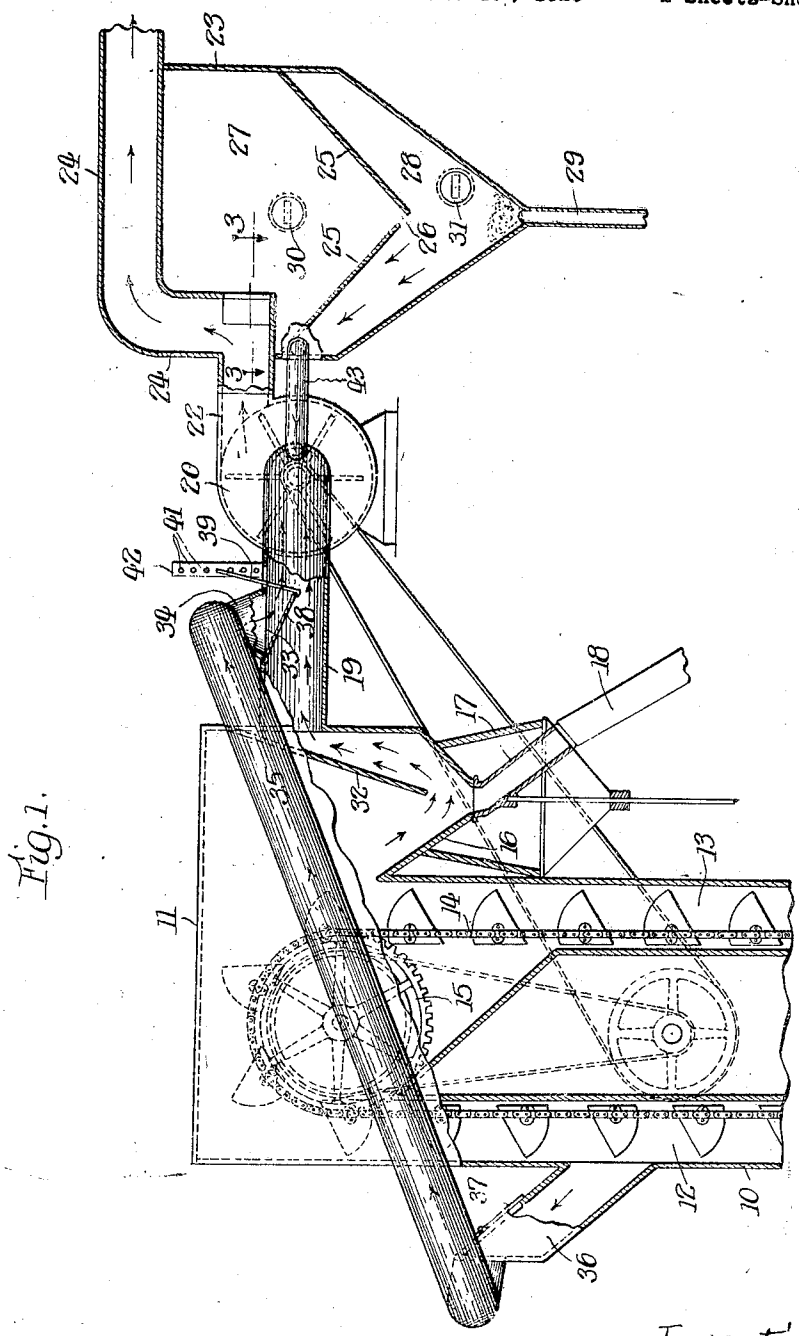


Fig. 1.

Witness:
A. J. Sawer

Inventor:
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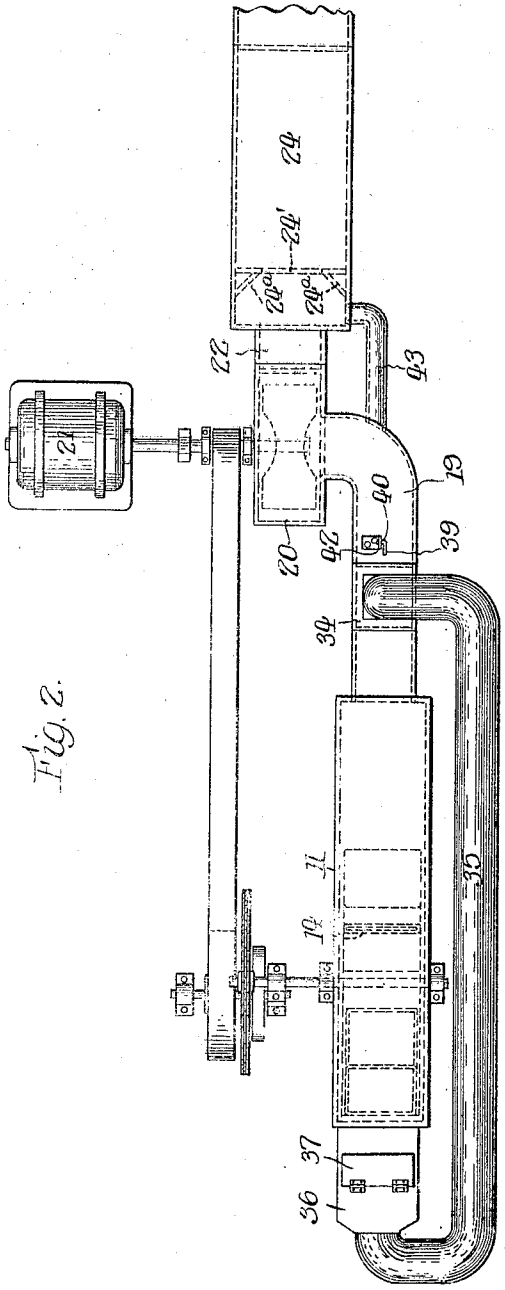


Fig. 2.

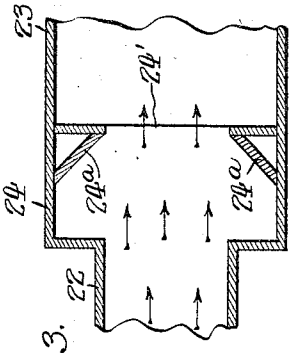


Fig. 3.

Witness:
T. J. Sauser.

Inventor:
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Patented Sept. 16, 1924. 1,508,682

UNITED STATES PATENT OFFICE.

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DEVICE FOR REMOVING DUST FROM GRAIN ELEVATORS.

Application filed September 15, 1923. Serial No. 662,828.

To all whom it may concern:

Be it known that I, ROY L. DOWDALL, a citizen of the United States, residing at Oberlin, in the county of Decatur and State of Kansas, have invented certain new and useful Improvements in Devices for Removing Dust from Grain Elevators, of which the following is a specification.

This invention relates to an improved device for freeing the head, leg and pit of a grain elevator from dust and for also separating out and discharging dust from light particles of grain that are abstracted from the main body of grain passing through the elevator by the suction of the dust abstracting device.

The present invention is in the nature of an improvement upon a device for the same general purposes forming the subject matter of an earlier application filed by me on the 25th day of January, 1923. Serial No. 614,736; and the principal objects sought by the present improvements are; to provide a device that will more thoroughly and efficiently free the elevator pit, leg and head from dust; to provide a device wherein the suction draft on the grain discharged by the elevator may be nicely regulated according to the character and weight of the grain handled; to provide a device in which the entire suction draft may be made effective on and divided between the head and leg sections of the elevator in any relative strengths desired; and to provide a device, including a receptacle for light grain carried over by the suction device, whereby any residuum of dust and chaff still remaining in such light grain may be drawn off and returned to and discharged with the main body of dust, and whereby also the necessity of a valve or gate at the discharge end of such collecting chamber may be obviated.

Other objects and attendant advantages of the invention will be understood by persons skilled in the art from the following detailed description, taken in connection with the accompanying drawings in which I have illustrated a practical embodiment of the invention which in service has been found to satisfactorily effectuate the stated purposes and objects thereof and wherein—

Fig. 1 is a view partly in vertical section and partly in side elevation of the head and upper portion of the leg of a grain elevator, showing my present improvements applied thereto;

Fig. 2 is a top plan view of the same; and

Fig. 3 is a horizontal section on the line 3—3 of Fig. 1.

Referring to the drawing, 10 designates as an entirety the vertical elevator leg, 11 the head thereof, and 12 and 13 the rear and front vertical passageways of the leg in which travel respectively the ascending and descending limbs of the usual endless bucket conveyor 14 running over a pulley 15 mounted in the head 11, by which conveyor the grain is elevated from the pit to the head and discharged in the latter.

Within the head 11 and on the delivery side of the bucket elevator is located the usual discharge hopper 16, the lower end of which communicates with an inclined swiveled delivery spout 17 that may be revolved on the axis of the hopper so as to communicate with any one of the usual series of distribution spouts, one of which is shown at 18. On and communicating with the delivery side of the head 11 is a pipe 19, herein shown as of rectangular cross-section, which, at its outer end, communicates with the suction side of a rotary high speed fan 20 driven by any suitable means such as a direct connected electric motor 21 indicated in Fig. 2. The casing of the fan 20 has a tangential discharge pipe 22 which opens directly into a light grain trap 23 and also communicates freely on its upper side with a dust discharge pipe or conduit 24 overlying the trap 23. The trap 23 and dust discharge pipe 24 are wider than the fan discharge pipe 22, and, as best shown in Fig. 3, the wall of the trap which also forms a part of the inner wall of the dust pipe is formed with an opening 24′ of the same cross-section as, and registering with, the fan discharge pipe 22; the vertical edges of said opening being preferably flanked by inclined guides 24^a to direct all of the grain carried over with the fan discharge into the trap. The trap 23 is also provided with a pair of internal louvers 25 so disposed as to form at their lower ends a narrow gravity flow passage 26 into the lower portion of the trap; the space above the louvers constituting a dead air chamber 27. The lower portion of the trap, below the louvers 25, constitutes a receptacle 28 for light and defec-

tive grain and chaff that is too heavy to be blown out with the dust and fine chaff through the discharge passage 24; and the lower contracted end of this chamber communicates freely with the upper end of a pipe 29 through which the collected light grain is gradually discharged sufficiently slowly to maintain the lower end of the chamber 28 always sealed and thus prevent any circulation of air from the outside into and through the chambers 28 and 27.

In the sides of the chambers 27 and 28 are formed hand holes 30 and 31 respectively equipped with suitable covers, through which hand holes access may be had to remedy any clogging of the grain that may occur at the bottom of either chamber.

On the inner side of the vertical wall of the head 11 to which the suction pipe 19 is connected and opposite the inner end of said pipe is an inclined grain spreader 32 extending down into the discharge hopper 16, by which the grain, as it is discharged from the buckets of the conveyor, is spread directly across the path of the air current.

In the top wall of the suction conduit 19 is formed an opening 33 above which is mounted a tapered hood or cover 34; the upper end of this cover communicating directly with one end of an inclined branch suction pipe 35 that extends across one side of the head 11 and, at its other end, communicates directly with an inclined branch 36 on the remote ascending conduit 12 of the conveyor leg. The upper wall of the branch 36 is herein shown as equipped with a hinged door 37 which may be opened for the purpose of facilitating the cleaning of the pipe 35 and branch 36 when necessary.

Within the suction conduit 19 and hinged coincidentally with one transverse edge of the opening 33 is a swinging valve 38, to the free edge of which is pivoted an operating rod 39 extending upwardly through the wall of the conduit and terminating at its upper end in a bent end 40 which may be engaged with any of a series of vertically spaced holes 41 formed in a post 42 mounted on the conduit so as to maintain said valve at a variety of points intermediate fully opened and fully closed position with relation to the opening 33.

With the valve in the partly opened position shown in Fig. 1, the suction draft is manifestly divided, acting partly through the discharge hopper 16, head 11, and the front conduit 13 of the elevator leg and partly through the pipe 35, branch pipe 36, and rear conduit 12 of the elevator leg; the suction through both ways, of course, being connected to the pit (not shown).

By reason of the described construction the entire suction effect of the fan is always applied to the elevator head, leg and pit, without any leakage from the outside where the joints are properly sealed; and, by varying the position of the valve 38, the suction may be increased or decreased through either branch of the divided suction conduit, as desired. Where a heavy grain like wheat is handled, the valve is so adjusted as to create a fairly strong suction across the grain falling from the spreader 32, and when a light grain like oats is handled, the valve is set to cause a much lighter suction at that point. But whatever may be the adjustment for the weight and character of the particular grain handled, the entire suction is always effective for freeing the pit, leg and head from dust.

The abstracted dust, together with light and defective particles of grain (which are too valuable to be thrown away with the dust) and chaff are blown through the discharge pipe 22. The grain and coarse chaff, being heavier than the dust, pass directly into and settle in the upper chamber 27 of the trap, while most of the dust and fine chaff being lighter, flows upwardly and out through the dust discharge flue 24; the discharge of the fan creating sufficient pressure within the chamber 27 to thus force the dust and fine chaff to rise and flow out through the flue 24. The recovered grain flows slowly through the narrow opening 26 into the grain collecting chamber 28, constantly maintaining a grain seal at the flow passage 26. From the chamber 28 the grain, freed for the most part from the dust, flows gradually through the discharge pipe 29, to any desired point of delivery.

43 is a relatively small pipe that connects the upper end of the chamber 28 with the suction side of the fan through the elbow of the suction pipe 19. The purpose of this pipe is two fold. In the first place, it serves to return to the fan and the main body of dust any small residue of dust and chaff that may find its way with the grain through the chamber 27 and into the collection chamber 28; and, in the second place, it creates a slight vacuum in the chamber 28 which aids the flow into the latter of the grain from the chamber 27 and also sufficiently retards the outflow of the grain through the discharge pipe 29 to maintain a constant grain seal in the lower end of the chamber 28, and obviates the necessity at that point of a counterweighted hinged gate or valve such as is disclosed in my former application above identified.

In addition to keeping the elevator and pit practically free from dust and separating the dust out of both the whole grain and the defective or light grain, the device by creating a draft through the leg keeps the bearings of the conveyor clean and prevents hot boxes and dust explosions. Incidentally also it not only cleans the whole grain, but it

saves and collects the light and defective grain which is valuable as stock and chicken feed, and throws away only the valueless dust and chaff.

Manifestly the specific form and details of structure and arrangement may be variously modified without departing from the principle of the invention or sacrificing any of the advantages inherent therein, and hence I reserve all such variations and modifications as fall within the spirit and purview of the appended claims.

I claim—

1. In an apparatus of the character described, the combination with a leg of a grain elevator, of a suction fan, a pair of suction pipes both communicating at one end with the suction side of said fan and at their other ends with said leg, and a single manually operable valve operative to direct the suction wholly through either of said pipes or to divide it in varying relative strengths between them.

2. In an apparatus of the character described, the combination with the leg and head of a grain elevator, of a suction fan, a main suction pipe connected at one end into said head and at its other end to the suction side of said fan, a branch suction pipe connected at one end into said leg and at its other end into said main suction pipe, and a single valve at the junction of said pipes serving to regulate the relative strengths of the suctions therein.

3. In an apparatus of the character described, the combination with the leg and head of a grain elevator, of a suction fan, a main suction pipe connected at one end into the side of said head nearest to said fan and at its other end to the suction side of said fan, a branch suction pipe connected at one end into the side of said leg remote from said fan and at its other end into said main suction pipe, and a valve at the junction of said pipes serving to regulate the relative strengths of the suctions therein.

4. In an apparatus of the character described, the combination with a leg and head of a grain elevator, of a suction fan, a main suction pipe connected at one end into the side of said head nearest to said fan and at its other end to the suction side of said fan, a branch suction pipe connected at one end into the side of said leg remote from said fan and at its other end into said main suction pipe, a hinged valve at the junction of said pipes, and means for regulating said valve so as to more or less open or throttle one of said pipes and simultaneously correspondingly throttle or open the other.

5. In an apparatus of the character described, the combination with the leg and head of a grain elevator, an endless bucket elevator mounted therein, of a spreader board mounted in said head opposite the bucket discharging position of said conveyor, a suction fan, a main suction pipe connected at one end into said head behind said spreader board and at its other end to the suction side of said fan, a branch suction pipe connected at one end into said leg and at its other end into said main suction pipe, a valve at the junction of said pipes, and means for regulating said valve so as to vary the strength of the suction exerted through said main suction pipe upon the grain falling from said spreader board, according to the character of the grain handled.

6. In an apparatus of the character described, the combination with a grain elevator leg, of a suction fan, a suction pipe communicating at one end with said leg and at its other end with the suction side of said fan, a discharge pipe for said fan, a trap for collecting light grain and chaff carried over by said fan discharge pipe, a discharge pipe for dust communicating with said trap, and a return suction pipe connecting said trap with the suction side of said fan.

7. In an apparatus of the character described, the combination with a grain elevator leg, of a suction fan, a suction pipe communicating at one end with said leg and at its other end with the suction side of said fan, a discharge pipe for said fan, a trap for collecting light grain and chaff communicating directly with the delivery end of said fan discharge pipe, a dust discharge pipe connected into the top of said fan discharge pipe, and a return suction pipe connecting said trap with the suction side of said fan.

8. In an apparatus of the character described, the combination with the leg of a grain elevator, of a suction fan, a suction pipe communicating at one end with said leg and at its other end connected into the suction side of said fan, a discharge pipe for said fan, a trap for collecting light grain and chaff communicating directly with the delivery end of said fan discharge pipe, a dust discharge pipe connected into the top of said fan discharge pipe adjacent to said trap and extending above the latter, a return suction pipe connecting said trap with said first-named suction pipe, and a delivery pipe in open communication with the lower end of said trap.

ROY L. DOWDALL.