R. C. STONE.

GRAIN ELEVATOR.

APPLICATION FILED JUNE 9, 1920.

1,433,754.

Patented Oct. 31, 1922.

2 SHEETS—SHEET 1.

Fig. I.

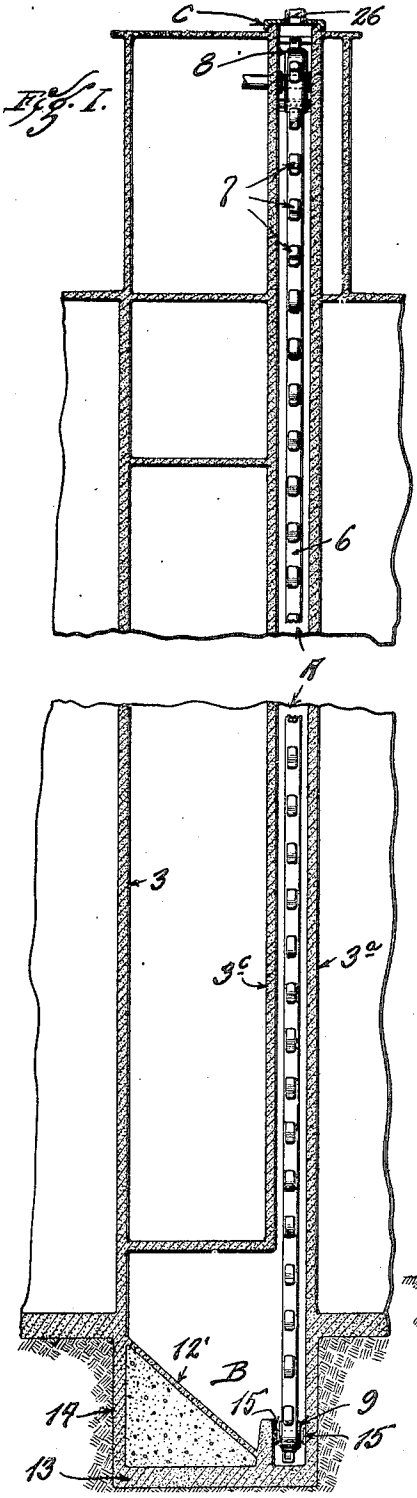
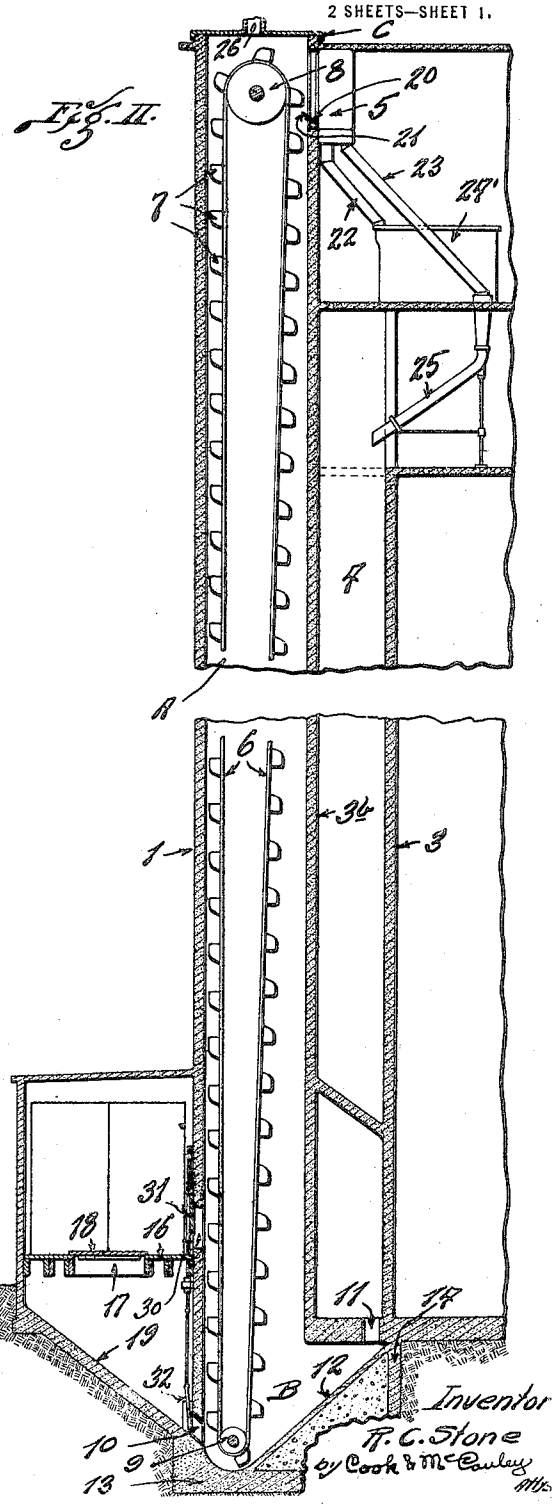


Fig. II.



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2 SHEETS—SHEET 2.

Fig. III.

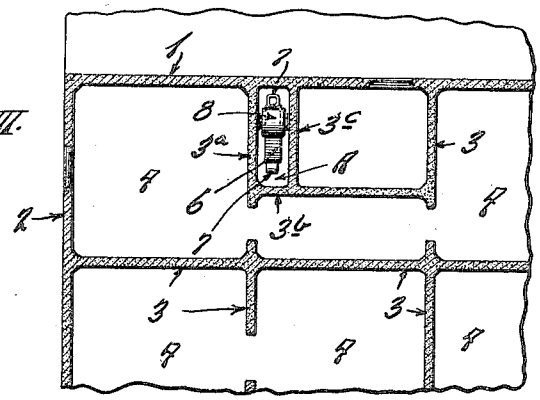


Fig. IV.

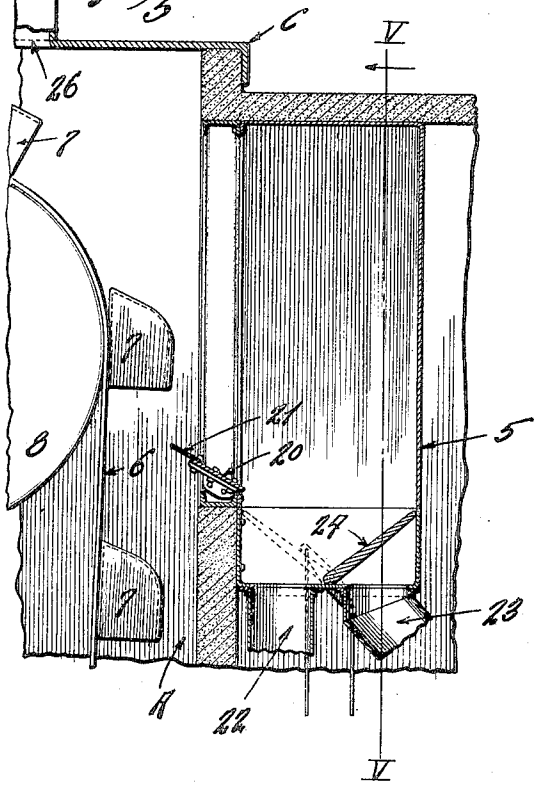
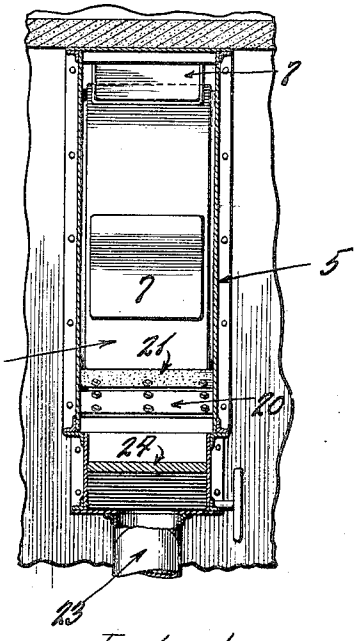


Fig. V.



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UNITED STATES PATENT OFFICE.

RICHARD C. STONE, OF ST. LOUIS, MISSOURI.

GRAIN ELEVATOR.

Application filed June 9, 1920. Serial No. 387,745.

To all whom it may concern:

Be it known that I, RICHARD C. STONE, a citizen of the United States of America, a resident of the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Grain Elevators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to improvements in grain elevators, and more particularly to an elevator leg and certain elements combined therewith. One object of the invention is to provide a simple and inexpensive means for avoiding or minimizing the danger of explosions in grain elevators. A further object is to eliminate a very large percentage of the dust which is ordinarily permitted to accumulate in grain elevators, where it is not only a fire hazard on account of the liability of dust explosions, but it is also a source of discomfort, annoyance and inconvenience to persons employed in the elevators. Another object is to facilitate the delivery of fresh air to the grain while it is in transit in the elevator, such ventilation being especially desirable while the grain is being "turned" or transferred from one bin to another to prevent deterioration which would otherwise result from prolonged storage.

In accordance with the present invention, all of the foregoing objects can be attained by a simple combination of elements including an elevator leg provided with a simple and inexpensive dust-eliminating means, as will be hereinafter described, whereby the dust is constantly discharged from the building so as to effectively dispose of the explosive dust which has heretofore caused fire and explosions, as well as the many inconveniences resulting from large accumulations of dust in various parts of the elevator building. The dust-eliminating means preferably consists of a simple ventilator combined with the elevator leg to cause a constant circulation of air through the leg, and at the same time provide an outlet for the dust laden air.

In a grain elevator, a destructive fire may be started by the ignition of a small body of explosive dust, if the resultant flame or sparks are permitted to escape into a larger body of the dust, and the elevator leg includes certain elements which under some conditions produce sparks or flame whereby the dust is readily ignited. Sparks resulting from static electricity are sometimes formed adjacent to the belt and pulleys in an elevator leg, and under some conditions the belt is retarded while the driving pulley at the top of the elevator leg is rotated, thus causing friction which results in intense heat, or fire, whereby any adjacent dust may be readily ignited. For these reasons extreme precaution should be taken to avoid explosions in an elevator leg, and since a minor explosion may occur in spite of the precautions herein pointed out, it is important to minimize the effect of such explosions.

I therefore realize that under some unusual conditions, an explosion may occur in the elevator leg, even though the explosive dust is constantly discharged therefrom by the use of my dust-eliminating means, so I have herein disclosed a relief device corresponding to a safety valve, whereby high pressure in an elevator leg may be instantly relieved. If an explosion occurs in the elevator leg, this device will permit free escape of the resultant flame and sparks, so as to prevent ignition of a larger body of explosive dust in some other part of the elevator.

Another object is to increase the space for storage of grain in an elevator and at the same time very materially reduce the initial cost of the elevator legs. Prior to this invention, elevator legs have been constructed as individual units separate from the vertical walls of the elevator building, and the ordinary practice has been to locate the legs about two feet from the adjacent walls of the building so as to provide space for the workmen engaged in erecting the legs. This space has no value for the storage of grain, and since the purpose of a grain elevator is to provide storage space I desire to eliminate the space between the elevator leg and the building walls. To economize in the cost of the elevator building, I also utilize two or more walls of the building as walls for the elevator leg. Owing to the value of the storage space and also to the cost of erecting very tall elevator legs, the elimination of the space between the building walls and the elevator leg and the elimination of two or more walls of each elevator leg are important features of this invention.

Another object is to provide a simple elevator leg made of concrete and formed in-

tegral with the walls of the elevator building.

A further object is to improve the boot at the bottom of the elevator leg.

Fig. I is a vertical section illustrating a portion of an elevator building provided with a leg embodying the features of this invention.

Fig. II is a vertical section taken approximately through the center of the leg shown in Fig. I, the elevating device being shown in elevation.

Fig. III is a horizontal section showing the elevator leg and certain walls of the building adjacent thereto.

Fig. IV is an enlarged fragmentary vertical section showing the discharge ducts and the ventilator at the top of the elevator leg.

Fig. V is a vertical section taken approximately on the line V—V, Fig. IV.

The elevator comprises vertical outside walls 1 and 2, and vertical partition walls 3 whereby the building is divided into a number of grain bins 4, as shown most clearly in Fig. III. Certain vertical partition walls, designated by 3^a and 3^b are associated with the outside wall 1 to form three walls of an elevator leg A. The remaining wall of the elevator leg is designated by 3^c. The elevator leg is thus formed by merely adding the single wall 3^c to the walls 1, 3^a and 3^b which form essential parts of the building structure. Therefore, the cost of the single wall 3^c (Fig. III) may be considered as the total cost of the elevator leg. In addition to effecting a very material saving in the cost of the elevator building I economize in storage space by eliminating the spaces between an ordinary elevator leg and the adjacent walls of the building.

The long vertical walls of the elevator leg are preferably made of concrete. They are formed integral with each other and integral with the building structure. By making the leg in this manner, its inner faces can be perfectly smooth, and the entire leg can be easily formed during the erection of the building.

The elevator proper comprises a vertically arranged endless conveyor whereby the grain is carried from an inlet at the bottom of the elevator leg to an outlet in the form of a discharge box 5 at the top of the elevator leg. The endless conveyor comprises a belt 6 and buckets 7 secured thereto. The belt is mounted on a drive pulley 8 at the top of the elevator leg and a smaller pulley 9 which lies in the boot B at the bottom of the elevator leg, said boot having inlets 10 and 11 (Fig. II) for the admission of grain to the elevating device. The elevator leg and the boot are made of concrete, said leg being enlarged at the bottom to form a boot.

The boot comprises a bottom wall 12 inclined upwardly at one side of the elevator leg, as shown in Fig. II, a concrete base 13 below said inclined wall 12, and a vertical support wall 14 connecting the upper end of said inclined wall to the base. The boot is also provided with an inclined wall 12′ (Fig. I) whereby grain accumulating therein may be deflected toward the elevating device. The bearings 15 for the pulley 9 (Fig. I) are located entirely within the boot where they are supported in concrete walls forming part of the boot structure. In Fig. II, I have shown a driveway, or platform 16 located at one side of the elevator structure and provided with an opening 17 normally closed by a suitable door 18. The grain dumped into this opening 17 will fall onto an inclined wall 19 leading to the intake opening 10 near the bottom of the boot.

The discharge box 5, located near the top of the elevator leg, is open at one side to receive the grain discharge from the buckets 7. The speed of the buckets is great enough to discharge the grain into the discharge box 5. Near the lower portion of the discharge box (Fig. IV) an inclined deflector 20 is provided with a flexible extension 21 which projects into the elevator leg where it may be engaged by the descending buckets 7. The discharge box is provided with two discharge spouts 22 and 23 and a valve 24 which may be shifted from the position shown by full lines to the position shown by dotted lines in Fig. IV, so as to control the delivery to either spout. The spout 22 leads to a receptacle 24′, and a spout 23 leads to a turn-spout 25 which may be shifted to direct the grain to different parts of the elevator structure.

I will now describe the means for constantly discharging explosive dust from the elevator leg, and the safety closure adapted to yield in response to abnormal pressure in the elevator leg, so as to relieve the pressure resulting from an explosion in the leg. C designates a safety closure seated by gravity on the top of the elevator leg so that it can be readily blown off in response to abnormal pressure in the leg. This closure lies entirely above the grain elevating apparatus, and it is not attached or fastened in its closed position. This closure has a dust outlet 26 (Fig. IV) through which a constant stream of dust-laden air is discharged. As a simple means for removing the dust and at the same time ventilating the grain in the elevator leg, I have shown a wind-actuated ventilator 27 mounted on the safety closure C at a point directly above the dust outlet 26.

Air currents may be admitted at the inlets 10 and 11 (Fig. II) through which grain is delivered to the boot, and in this event the incoming air would pass through the boot. However, these inlets are sometimes choked by the incoming grain and it is desirable to have a separate air inlet near the lower end

of the elevator leg. In Fig. II, I have shown a fresh air inlet 30 in the wall 1 which lies adjacent to the rising elevator buckets that are filled with grain. A vertically movable door or valve 31 (Fig. II), located at the inlet 30, may be adjusted to regulate the admission of fresh air at this inlet. A similar door 32 (Fig. II) may be adjusted to open and close the inlet 10.

From the foregoing it will be readily understood that delivery of air to the bottom of the leg can be regulated to obtain the most satisfactory circulation of air under different conditions.

Referring again to the concrete elevator leg, and especially to the upper portion thereof, it will be noted that the concrete walls of the leg are continued to form the sides of elevator head, and that the driving pulley 8 is located very close to the safety closure C which forms the top wall of the elevator head.

I claim:

1. A grain elevator having a vertical elevator leg provided with a grain inlet at its lower end and a grain outlet at its upper end said elevator leg also having an air inlet at its lower end and a dust outlet at its upper end, and a wind-actuated ventilator whereby air is drawn into said elevator leg through said air inlet and discharged from said elevator leg through said dust outlet.

2. A grain elevator having a vertical elevator leg provided with a grain inlet at its lower end and a grain outlet at its upper end, said elevator leg also having an air inlet at its lower end and a dust outlet at its upper end, a wind-actuated ventilator whereby air is drawn into said elevator leg through said inlet and discharged from said elevator leg through said dust outlet, and means whereby the flow of air through said elevator leg may be regulated.

3. A grain elevator having a vertical elevator leg provided with a grain inlet at its lower end and a grain outlet at its upper end, said elevator leg also having an air inlet at its lower end and a dust outlet at its upper end, a wind-actuated ventilator whereby air is drawn into said elevator leg through said inlet and discharged from said elevator leg through said dust outlet, and means comprising an adjustable closure at said air inlet whereby the flow of air through said elevator leg may be regulated.

4. A grain elevator having a vertical elevator leg provided with a grain inlet at its lower end and a grain outlet at its upper end, said elevator leg also having a dust outlet at its upper end, and a wind-actuated ventilator located at said dust outlet to provide a draft of air moving upwardly in said elevator leg throughout the height thereof.

5. A grain elevator having a vertical elevator leg provided with a grain inlet at its lower end and a grain outlet at its upper end, said elevator leg also having an open upper end extending above said grain elevator, and a pressure relieving closure for said open upper end of said elevator leg, said closure being adapted to open in response to abnormal pressure in the elevator leg so as to relieve the pressure resulting from an explosion in the leg.

6. A grain elevator having a vertical elevator leg provided with a grain inlet at its lower end and a grain outlet at its upper end, said elevator leg also having a discharge opening, and an outwardly opening closure for said discharge opening, said closure being free to open in response to abnormal pressure in the elevator leg so as to relieve the pressure resulting from an explosion in the leg, and said closure being provided with a normally open dust outlet.

7. A grain elevator having an elevator leg provided with a grain inlet at its lower end and a grain outlet at its upper end, and a vertically arranged endless conveyor whereby the grain is carried from said inlet and discharged into said grain outlet, said elevator leg also having a discharge opening at the top, a safety closure seated by gravity on the top of said leg, said closure being free to open in response to abnormal pressure in the elevator leg, so as to relieve the pressure resulting from an explosion in the leg, and a wind-actuated ventilator located on said closure.

In testimony that I claim the foregoing I hereunto affix my signature.

RICHARD C. STONE.