Sept. 15, 1959 P. WERNER, JR 2,903,955

AERATION UNIT FOR GRAIN

Filed Jan. 19, 1956 2 Sheets-Sheet 1

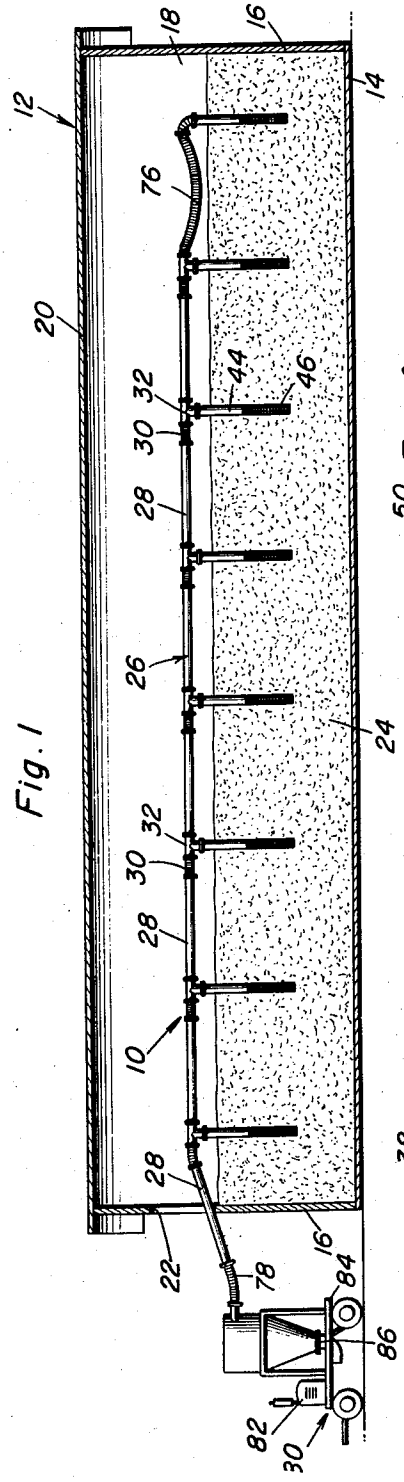


Fig. 1

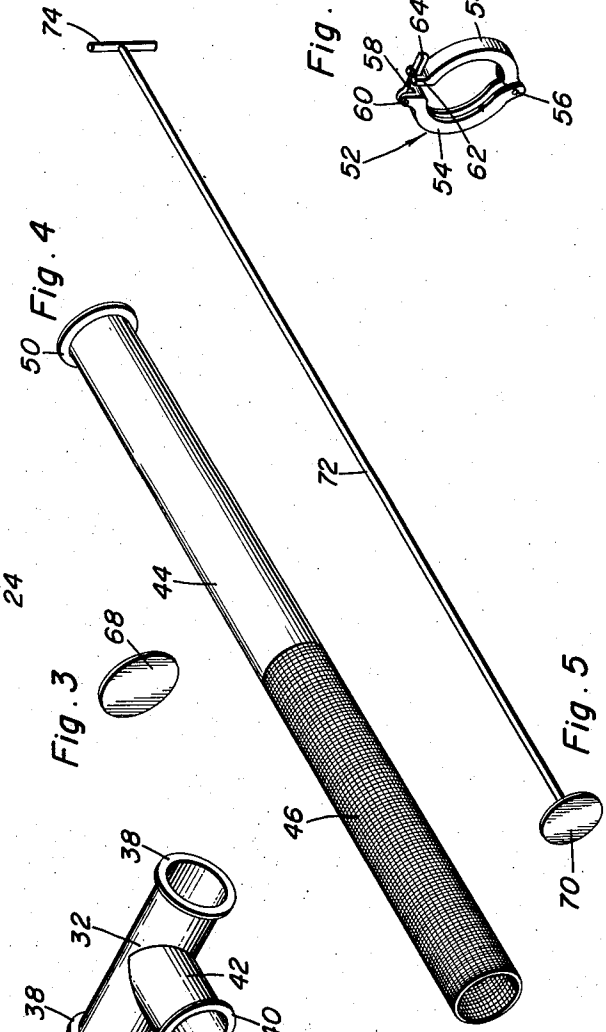


Fig. 5

Fig. 3

Fig. 2

Fig. 6

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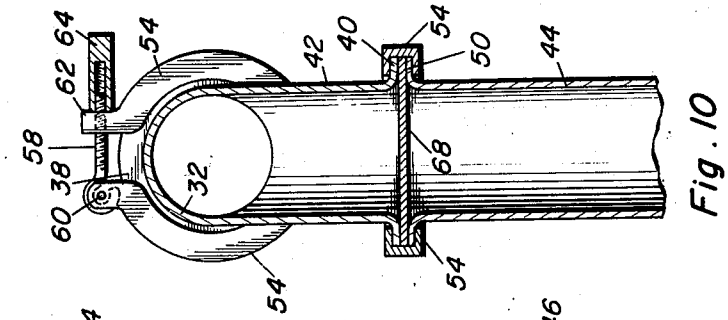


Fig. 10

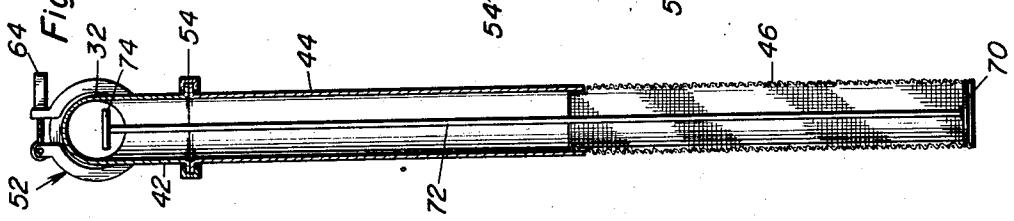


Fig. 9

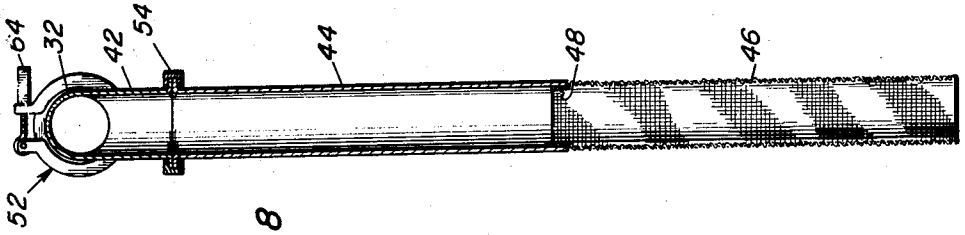


Fig. 8

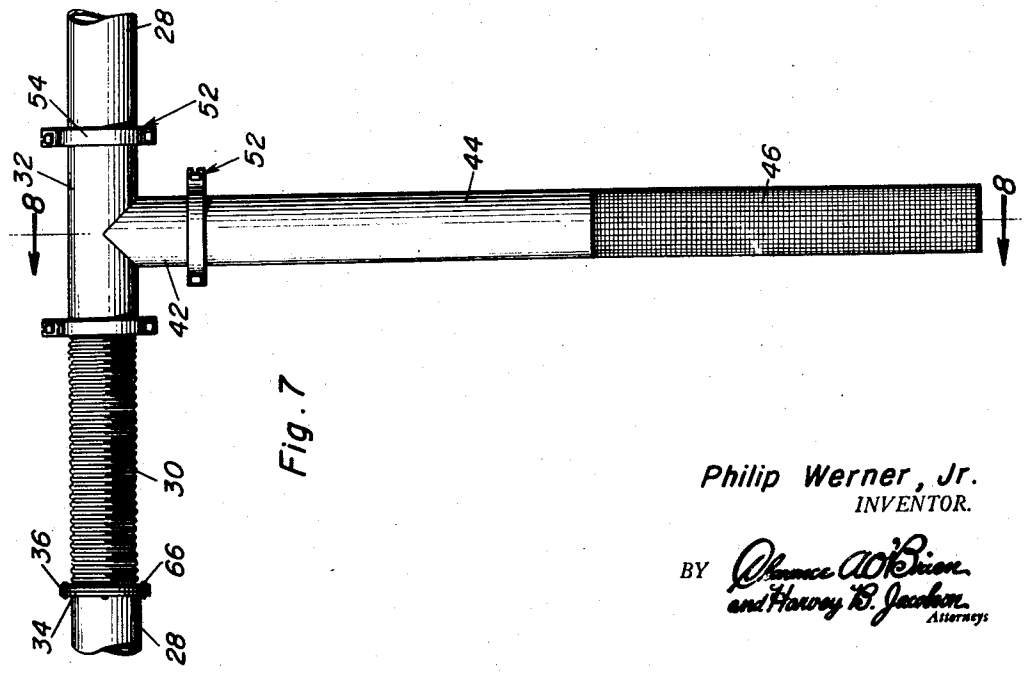


Fig. 7

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AERATION UNIT FOR GRAIN

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3 Claims. (Cl. 98—56)

This invention generally relates to a grain treating apparatus and more specifically includes an apparatus for aerating grain that is stored in a bin or in a similar enclosure or stored in any manner wherein a relatively large bulk or quantity of grain is stored in a pile.

In the storage of grain such as wheat, the use of various type bins have been employed for storing surplus grain for future use. As is well known, the grain has a certain moisture content when it is stored and this moisture content will begin deterioration of the grain wherein the interior of a large heap or quantity of grain will be extremely hot thereby increasing the rate of spoilage of the grain. Accordingly, it is the primary object of the present invention to aerate the grain by circulating air through the interstices between adjacent grains or kernels in the heap of grain.

Another object of the present invention is to aerate grain stored in a bin by exhausting air from the central area of the wheat wherein air from the exterior of the wheat will pass through the interstices thereby cooling and drying the grain for reducing the spoilage caused by excessive moisture and heat.

A further object of the present invention is to provide an aerating apparatus for grain including in its construction means for expelling air which is communicated with an elongated tubular member extending over the top surface of the grain that has a plurality of vertical pipes extending downwardly into the grain and communicated with the tubular member thereby exhausting air from the interior of the grain.

Still another important object of the present invention is to provide a grain aerating device including a screen mesh intake for the air expelling means together with a valve means for selectively closing off the intake and also means for closing off the open end of the intake to prevent grain from being discharged through the air expelling means.

Other objects of the present invention will reside in its extreme simplicity of construction, ease of use, effectiveness for its particular purpose and its relative inexpensive manufacturing cost.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a schematic side elevational view illustrating a grain storage building having the aerating device of the present invention installed therein for circulating air through the grain;

Figure 2 is a perspective view of the T-coupling forming a part of each section of the tubular member;

Figure 3 is a perspective view of a valve plate which may be employed for closing off selective down pipes;

Figure 4 is a perspective view of one of the down pipes;

Figure 5 is a perspective view of a closure plate which may be inserted in a down pipe for closing the bottom end thereof to prevent any grain from being sucked into the down pipe;

Figure 6 is a perspective view of the clamp collar for attaching the down pipe to the T-coupling;

Figure 7 is an enlarged detail view illustrating the specific construction of the tubular member, the flexible section therein, the T-coupling and the down pipe;

Figure 8 is a detailed sectional view taken substantially upon a plane passing along section line 8—8 of Figure 7 illustrating the details of the connecting clamp and the relationship of the T-coupling to the down pipe;

Figure 9 is a sectional view similar to Figure 8 illustrating the closure plate positioned in the lower end of the down pipe; and

Figure 10 is an enlarged sectional view similar to a portion of Figure 8 with the closure plate inserted between the branch portion of the T-coupling and the down pipe for closing the down pipe.

Referring now specifically to the drawings, the numeral 10 generally designates the aerating unit of the present invention. For purposes of illustration and description, the present invention is illustrated and described in conjunction with a storage building or bin generally designated by the numeral 12 and including a bottom 14, end walls 16, side walls 18 and a roof 20 with one of the end walls 16 being provided with an access opening 22 to permit insertion of grain 24 into the bin 12.

Referring now specifically to Figure 1, it will be seen that the aerating unit 10 of the present invention includes an elongated tubular member or conduit generally designated by the numeral 26 and which is constructed of a plurality of rigid pipe sections 28, a short flexible pipe section 30 and a T-coupling or fitting 32 all arranged in longitudinal alignment and separable from each other and disposed in alterating relation.

Referring now specifically to Figure 7, it is pointed out that each pipe section 28 is provided with an end flange 34 and the flexible pipe section 30 is provided with a flange 36 on each end thereof and the T-coupling or fitting 32 is provided with a flange 38 on each end thereof and a flange 40 on the branch portion 42 of the T-coupling 32 wherein the branch portion 42 faces downwardly towards the grain 24 when the tubular member 26 is disposed in generally horizontal relation substantially parallel to the upper surface of the grain.

Attached to the branch portion 42 of each T-coupling 32 is an elongated depending cylindrical pipe 44 having the lower end portion thereof formed of screen mesh or suitable reticulated material 46 wherein the upper end of the screen mesh material 46 is telescoped within the lower end of the solid portion of the down pipe 44 as indicated by the numeral 48. The upper end of the down pipe 44 is provided with a flange 50 for abutment against the flange 40 on the T-coupling 32.

Referring now specifically to Figure 6, clamp means generally designated by the numeral 52 is illustrated for securing the various sections of the pipe together. This clamp means includes a pair of U-shaped members 54 which are channel-shaped in transverse cross section and which are pivotally secured together at one end thereof by a hinge pin 56 and the other ends thereof are secured together by an eye bolt 58 attached to the hinge pin 60 on one member 54 and extending through a bifurcated end portion 62 on the other member 54 and provided with a nut 64 for clamping the U-shaped members 54 in encircling relation to adjacent flanges substantially as illustrated in Figure 10. This clamp means is employed for securing the down pipe 44 to the T-coupling 32 and also for securing each flange 38 to a matching flange 36 on the

flexible portion **30** and a flange **34** on the rigid pipe **28** thereby detachably securing the sections of the pipe together.

Fastening bolts **66** may be employed for securing one end of the flexible member **30** to the rigid pipe **28** since this is a semi-permanent connection.

Referring specifically to Figure 3, it will be seen that a circular plate **68** is provided which may be inserted between the flanges **40** and **50** on the T-coupling **32** and down pipe **44** respectively for closing off a selective down pipe **44** when desired.

Referring specifically to Figure 5, it will be seen that a circular plate **70** is provided with an elongated rod **72** with a transverse handle **74** on the upper end thereof whereby the plate **70** may be inserted downwardly through the opened upper end of the down pipe **44** and disposed in the open end of the reticulated member **46** thereby forming a closure for the lower end of the down pipe **44** to assure that no grain will be sucked upwardly into the pipe **44** after the down pipe **44** has been installed.

As illustrated in Figure 1, the end section of the tubular member **26** is provided with a flexible tubular member **76** to permit wider variation of movement of the last down pipe **44**.

In installing the down pipes **44**, the pipes are inserted into the grain **24** while the grain is pumped out of the pipe as it is pushed downwardly by any suitable grain expelling means. After the pipe **44** has been lowered to the desired depth, it is connected to the T-coupling **32** which has been previously connected to the flexible portion **30** thereby permitting the pipe **44** to be positioned within certain limits of inaccuracy and still permitting the tubular member **26** to be connected thereto. The end pipe section **28** is connected to a flexible portion **78** which is communicated with a portable air expelling means generally designated by the numeral **80** and including a power device **82**, a mobile frame **84** and an air discharge fan **86** for evacuating the pipes **44** thereby removing air from the interior of the pile of grain **24** whereby air will be circulated throughout the interstices between the individual kernels of grain thereby reducing the temperature and drying the grain.

In practical operation, a series of eight downpipes has been employed in a 40 foot by a 100 foot building with all pipe being 8 inches in diameter and the downpipes being 8 feet long with 4 feet being screen mesh and 4 feet being solid pipe. In this installation, air expelling means having a minimum capacity of 3,000 cubic feet per minute adequately aerated the grains.

While the device is illustrated in a bin, any stack of grain may be aerated and any type of grain may be treated. Also, the device may be employed for drawing grain treating gases through the grain for preventing damage caused by vermin such as weevils or the like.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A grain aerating device for use in combination with an enlarged grain bin filled with a substantial quantity of grain with the device being insertable into the grain after the bin has been filled and removable before the grain is removed from the bin thereby eliminating interference with the bin filling and emptying operation and preventing damage to the device during the filling and emptying operation, said aerating device comprising a mobile exhaust fan assembly disposed exteriorly of the grain bin, an elongated sectional conduit flexibly and detachably connected to the intake of the exhaust fan assembly, said conduit being disposed in overlying relation to the quantity of grain, each of the intermediate sections of the conduit including an elongated rigid pipe section, a short flexible pipe section and a T fitting with the pipe sections and fittings being detachably interconnected, each T fitting including a depending branch, an elongated depending cylindrical pipe aligned with and detachably connected to the depending branch of each T fitting, each depending cylindrical pipe having the lower end portion constructed of screen mesh material, a closure plate disposed in the lower end of the screen mesh portion of each depending pipe to prevent grain from being sucked into the depending pipe, each closure plate including an elongated rod and handle having a length at least equal to the length of the depending pipe for permitting the closure plate to be disposed in the lower end of the depending pipe for preventing entry of grain into the depending pipe after the depending pipe has been initially inserted into the grain and the grain pumped from the interior of the depending pipe.

2. The structure as defined in claim 1 wherein the outermost conduit section is completely flexible with the outer end thereof being provided with an elbow including a depending branch, and a depending pipe detachably connected to the depending branch of the elbow with the depending pipe connected to the elbow being identical in construction to the depending pipes connected to the T fittings.

3. The structure as defined in claim 1 wherein the depending branch of each T fitting is provided with a peripheral flange extending outwardly therefrom, the upper end of each depending pipe having a peripheral flange abuttingly engaging the flange on the T fittings, and a split channel-shaped clamp member detachably connecting the flanges together, and a circular plate insertable between the flanges and closing the passageway between the depending pipe and the T coupling with the valve plate being completely received within the confines of the flanges and maintained in position by the channel-shaped split clamp thereby closing off the depending pipe and preventing air flow therethrough.

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