Sept. 24, 1940. F. F. LEWIS 2,215,706

GRAIN SAMPLING DEVICE

Filed Feb. 20, 1939 2 Sheets-Sheet 1

FIG. 1

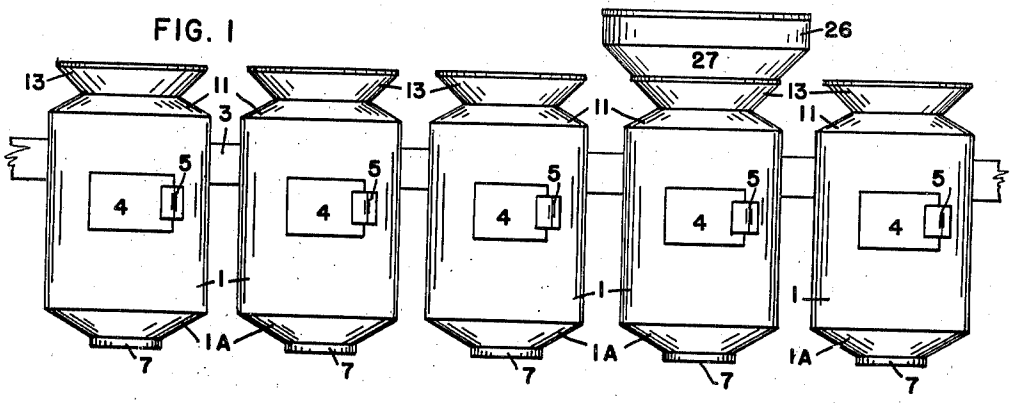


FIG. 2

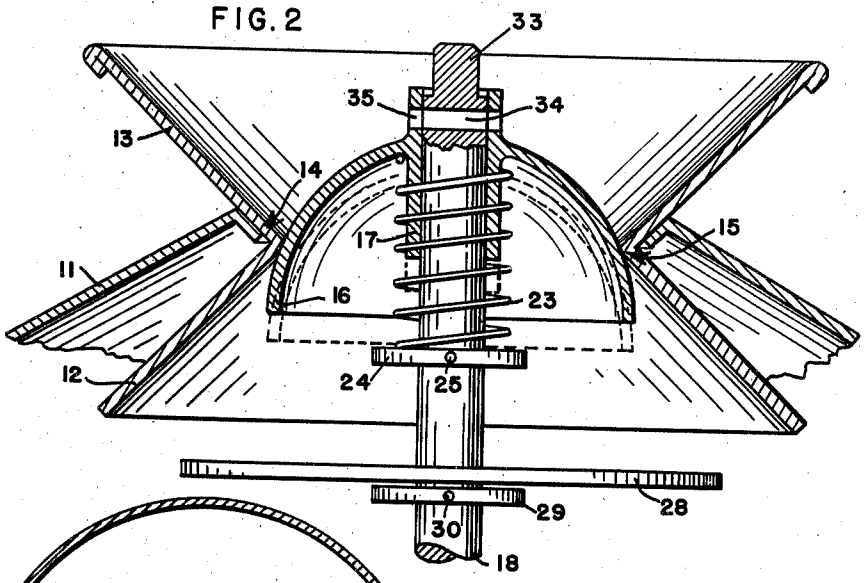
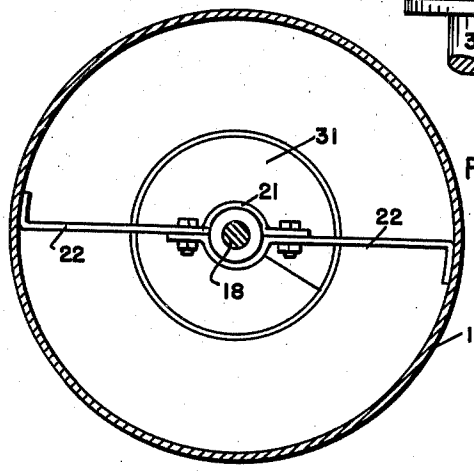


FIG. 3



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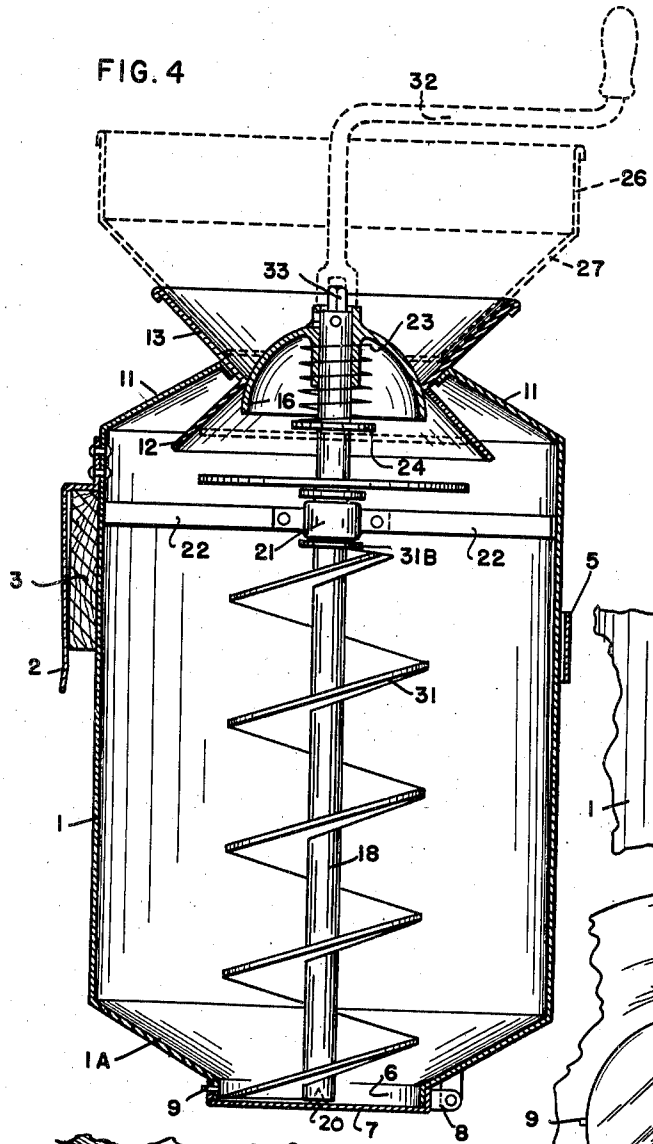
Attorney

Sept. 24, 1940. F. F. LEWIS 2,215,706

GRAIN SAMPLING DEVICE

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FIG. 4



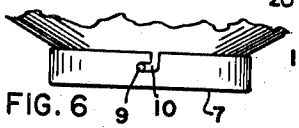
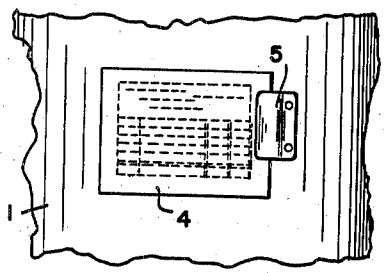


FIG. 6

FIG. 5



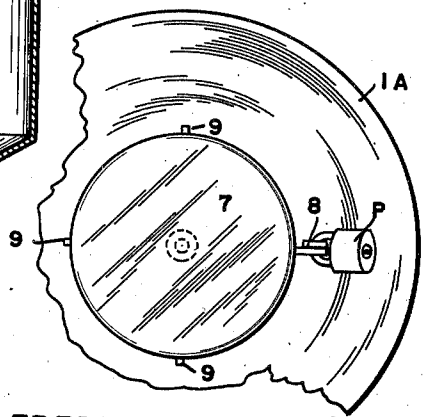


FIG. 7

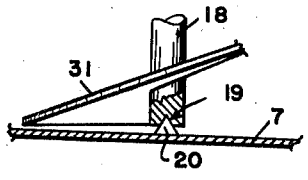


FIG 8

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Patented Sept. 24, 1940 2,215,706

UNITED STATES PATENT OFFICE

2,215,706

GRAIN SAMPLING DEVICE

Frederick F. Lewis, Brady, Mont.

Application February 20, 1939, Serial No. 257,422

10 Claims. (Cl. 259—8)

The present invention relates to improvements in grain sampling devices employed at storage plants, as grain elevators for the analysis of and grading the quality of grain, as wheat, to determine the price to be paid by the buyer to the farmer or grower or seller.

As is well known the successive loads of wheat hauled by the farmer to the elevator contain impurities, as "foul seed," broken and cracked grains, and other undesirable elements that escape the separation process of the threshing or harvesting machine. The grain buyer at the elevator employs the sampling device to determine the quality of the grain supplied by each farmer, and a sample of each load is deposited in the sampling device, the samples are mixed together in the sampling device, can, or container, and by analysis, an average of the quality of the entire delivery may be secured, and the weight per bushel found, in order to provide a basis for payment from the buyer to the farmer or grower of the wheat.

In order to prevent fraud the sampling devices or containers are locked or sealed to prevent introduction of other than the proper grain, and the sealed containers prevent escape of moisture between the times the successive samples are deposited in the containers.

The invention consists in certain novel combinations and arrangements in the construction and operation of the containers as will hereinafter be more fully set forth. In the accompanying drawings I have illustrated one complete example of the physical embodiment of my invention in which the parts are combined and arranged according to one mode I have thus far devised for the practical application of the principles of my invention, but it will be understood that various alterations and changes may be made in these exemplifying drawings, within the scope of my appended claims, without departing from the principles of my invention.

In the drawings:

Figure 1 is a view in elevation showing a number of the containers, one of which is assigned to each farmer hauling his grain to the elevator.

Figure 2 is an enlarged, detail, vertical sectional view at the top of the container, showing particularly the spring-closed valve.

Figure 3 is a transverse sectional view through the container and the agitator shaft and showing the top of the screw mixer or agitator mounted in the container.

Figure 4 is a detail vertical sectional view of the container and its working parts, showing by dotted lines the removable feed hopper and the crank for the mixer shaft, and also the means for supporting the container.

Figure 5 is a detail face view of a portion of the container showing the use of a record-card and its holder.

Figure 6 is a detail view showing a bayonet-slot fastening for the removable bottom of the container.

Figure 7 is a bottom plan view of the container.

Figure 8 is a detail view showing the bearing at the bottom of the container for the shaft of the mixer.

In Figure 1 I illustrate a number of the sampling devices which include a cylindrical container 1 of three or four gallons capacity, each having a detachable hanger or bracket 2 which, when not otherwise employed, is suspended on a beam or bar 3. Each container is provided with a record or data card 4 that is attached to the container under a resilient holder 5, preferably riveted to the container, and also used to identify the owner of the grain supplied to the container.

The lower portion of the container is provided with an inverted, conical, open bottom 1a and an annular flange 6, and a removable bottom-closure 7 for the container may be locked at 8 in Figure 4 by means of a padlock P in Figure 7.

The bottom-closure is fastened on the annular flange by bayonet joints comprising pins 9 on the flange and angular slots 10 in the flange of the closure, and when thus locked, access to the interior bottom end of the container is prevented, thus preventing fraudulent access to the container.

At its upper end the cylindrical container 1 is fashioned with a frusto-conical, open center top wall 11 in which is secured in suitable manner a head that includes a downwardly out-spreading skirt 12 and an upwardly, outwardly flaring, feed funnel 13, forming an annular neck 14 within the interior of the top of the container. This neck forms an interior, annular seat 15 for a hemi-spherical inlet valve 16, which is fashioned with a central slide sleeve 17 mounted upon a rotary central mixer shaft 18. As best seen in Figure 8, this shaft at its lower end is fashioned with a recess bearing 19, and the bottom 7 of the container is fashioned on its inner face with a conical bearing head 20 on which the recessed shaft rests and turns.

The rotary shaft 18, which projects upwardly through the container and also through the double-flared head of the container, is journaled near its upper end in a central bearing 21 which

is mounted in a pair of diametrically extending braces **22** with their outer ends attached in suitable manner to the inner cylindrical face of the container.

The hemispherical feed valve **16**, which closes the neck **15** or seat of the feed-head, is urged upwardly into the seat to close the seat by means of a coiled spring **23**, coiled about the slide sleeve **17** and part of the shaft, and interposed between a lower collar **24** fixed by pin **25** on the shaft, and the upper inner head of the valve. With its tightly sealed top and bottom the container becomes moisture proof, so that moisture cannot escape from the container and thereby change the weight of the sample, nor can moisture have access to the interior of the container through the two closed end valves, thus preventing a change in weight to the contained grain. The same conditions apply to the ingress or egress of dust to and from the interior of the container.

The successive samples of grain are deposited in the container through the use of a portable feed-hopper **26**, shown as mounted on one of the containers in Figure 1, and also shown by dotted lines in Figure 4. The feed-hopper has a truncated open-bottom portion **27** which fits neatly into the feed funnel **13** of the feed-head and surrounds the upper, exterior portion of the reciprocating valve **16**. The samples of grain are successively deposited in the hopper, covering the valve, and the spring-pressed or resiliently supported valve is depressed on the shaft **18** (as indicated by dotted lines in Figure 2) to open position, thereby permitting the grain to flow past the valve seat **15** to the interior of the container. The charge of grain falls in a circular stream and is thus added to the contents of the container, and after each deposit the inlet valve is automatically closed up against its seat by tension of the spring **23**.

To prevent fraudulent removal of grain from the container through the filling head, although the valve may be in open position, I provide a circular guard plate **28** slidable on the shaft **18** below the skirt **12** of the filling head, and located in such position as not to interfere with the ingress of the grain, but, on the other hand to prevent egress of grain from the container. As best seen in Figure 2 the guard plate is loosely or slidably supported on the shaft above a collar **29** fixed by pin **30** to the shaft. Thus should the container in Figure 4 be inverted in an attempt to fraudulently pour grain from the feed end or top of the container, this guard plate or trap-plate slides by gravity toward the valve, and finds a seat, as indicated by dotted lines in Figure 4, against the inner face of the skirt **12**, thus shutting off flow of the grain through the neck **15** to the exterior of the container. When the container is again righted, the guard-plate falls by gravity to its seat on the fixed collar **29**.

If desired, after the second deposit has been made, each succeeding deposit may be mixed with the contents of the container, or the mixing operation may be postponed until the sample from the last load of grain has been deposited in the container. In either event the grain of the successive deposits is thoroughly and uniformly mixed and intermingled to form a heterogeneous mass, or sample having the same characteristics throughout the capacity of the container.

In thus preparing a mixture for analysis in the laboratory I employ a suitable mixer and agitator within the container, here shown as a spiral conveyer blade **31** which is mounted rigidly on the shaft **18** below the guard plate **28**. The lower end of the spiral blade terminates in a scoop **31***a* that revolves with the shaft and picks up the grain in the well formed by the flange **6** and closure **7**, and the upper end of the blade is fixed to a collar **31***b* also secured to the shaft.

The shaft is manually turned by the use of a removable crank **32** (dotted lines Figure 4) which is readily attachable to the squared end **33** which projects above the closed valve **16**.

After the last sample of grain has been deposited in the container, and the crank has been attached to the squared end of the shaft, by bearing down on the crank and simultaneously revolving it, the grain is lifted at the center of the container and conveyed from the bottom thereof to the top of the spiral blade, and the lifted grain is replaced by grain falling or flowing down the sides of the container toward the bottom. In this manner a circulation of the grain is accomplished by means of which the original layer-samples are thoroughly mixed.

After the feed hopper and the operating crank have been removed, a lock or seal may be applied to the registering holes **34** and **35** in the upper end of the shaft and the upper end of the valve sleeve, respectively (Figure 2) to fasten or lock the valve in closed position, so that the container, closed and sealed at both ends, is ready for the laboratory test. The sealed container is then taken to the laboratory, and the first test is to ascertain the temperature of the grain and the moisture content.

Then, for further analysis to ascertain the percentage of "foul seed", dust, and other undesired elements, the crank may first be attached to the shaft and turned, the detachable bottom **7** is removed, and the contents of the container, while being agitated, is permitted to pour through the open bottom of the container and a representative sample obtained for protein analysis and/or grading and inspection.

In this manner successive samples of grain are deposited in the container, thoroughly mixed into a homogeneous mass having a representative quantity of dust, moisture, broken grains, and pure grains, and by analysis, any or all factors may be determined in percentages that are incorporated in an accurate report covering the entire lot or quantity of grain hauled by a grower or seller to the elevator, which influences the price to be paid by the buyer of the grain.

Various changes and alterations may be made in the structure of the container, and in the manner of carrying out the functions herein described for accomplishing the purposes of my invention, and it will be understood that such changes may be made within the scope of my appended claims, without departing from the principles of the invention.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a grain sampling device, the combination with a container having an openable discharge bottom and means for fastening said bottom, of an upper feed-head and neck forming a valve-seat, a grain mixing device within said container, a depressible valve closing said seat, interior resilient means for holding the valve in its seat, and slidable means within the container for preventing egress of grain through said seat when the container may be inverted.

2. In a grain sampling device, the combination with a container having an exterior feed-funnel,

and an interior outwardly flaring skirt forming an annular seat, of a reciprocating inlet valve closing said seat from the interior of the container, interior resilient means for holding the valve closed against its seat, and a gravity-actuated guard plate mounted within the container for co-action with said skirt to prevent egress of grain through said seat.

3. In a grain sampling device, the combination with a container having an openable discharge bottom, and means for fastening said bottom in closed position, of a vertically rotary shaft journaled longitudinally of the container and of a spiral blade fixed thereon, said container having a funnel-shaped head forming a valve seat, a reciprocating valve mounted on the shaft to close said seat, and resilient means mounted between the valve and a portion of the shaft for holding the valve to its seat.

4. In a grain sampling device, the combination with a container having an openable discharge bottom, and means for fastening said bottom in closed position, of a rotary shaft having an end bearing on said bottom and an upper bearing rigid with the container, said container having a funnel shaped head forming a valve seat, a reciprocating valve mounted on the upper end of the shaft to close said seat, and a spring interposed between the valve and a rigid portion of the shaft for holding the valve in closed position, and a spiral elevating blade mounted on the shaft.

5. In a grain sampling device, the combination with a container having an openable discharge bottom, and means for fastening said bottom in closed position, of a rotary shaft journaled at its lower end on said bottom and an upper bearing for said shaft rigid with the container, a spiral elevating blade mounted on the shaft, said container having an exterior funnel-shaped head and an interior downwardly flaring skirt forming a valve seat, a reciprocating valve mounted on the shaft to close said seat, a spring interposed between the valve and a portion of the shaft to hold the valve to its seat, and a gravity actuated guard plate slidable on said shaft for co-action with said skirt to prevent egress of grain past said seat.

6. A grain sampling device comprising a container having an upper open end and a removable bottom, a rotary mixer within said container comprising a shaft journaled at its lower end on said bottom and supporting a spiral elevating blade, a journal in the upper portion of the container for said shaft, means for rotating said shaft, a valve for closing the upper end of the container comprising a slide sleeve encircling said shaft, said sleeve having means for securing it to the shaft, a hemispherical valve member supported by said sleeve, and a coil spring anchored on one end to said shaft, encircling said sleeve and engaging the under side of said valve member.

7. A grain sampling device comprising an open end container, a rotatable mixer supported in said container and comprising a shaft supporting a spiral elevating blade, means for closing the lower end of said container, a valve for closing the upper end of the container comprising a slide sleeve encircling said shaft and supporting a hemispherical valve member adapted to fit against the rim of the upper open end, a spiral spring anchored at its lower end to said shaft, encircling said shaft and said sleeve and engaging the under side of said valve member to constantly urge the valve member upwardly toward its seat, and means for depressing said sleeve when the rotatable mixer is being operated.

8. In a grain sampling device, the combination with a container having an openable discharge bottom and means for fastening said bottom, of an upper feed-head and neck for the container, a vertically rotatable shaft supported within said container, a spiral elevating blade fixed on said shaft, means for rotating the shaft, a reciprocating valve closing said neck and slidable on said shaft, and resilient means supporting the valve in its closed seat.

9. In a grain sampling device, the combination with a container having an openable discharge bottom and means for fastening said bottom, of a converging top-wall and a funnel-head forming an intermediate valve-seat, a vertically rotatable shaft supported within said container, a spiral elevating blade fixed on said shaft, means for rotating the shaft, a reciprocating valve closing the seat and slidable on said shaft, and interior means resiliently supporting the valve in its seat.

10. In a grain sampling device, a combination with a container having an upper open end, a removable bottom and fastening means therefor, of a shaft journaled in said container and having a depressible spring-pressed valve slidable thereon for closing the upper end of the container, a gravity actuated guard plate slidable on said shaft for coaction with the upper open end to prevent the egress of grain thereto when the container may be inverted, a rotary mixing device mounted within the container and operating means therefor, and means for fastening the valve in closed position.

FREDERICK F. LEWIS.