Jan. 5, 1954 E. A. JOHNSON 2,664,751

GRAIN SAMPLER

Filed Jan. 11, 1951 2 Sheets-Sheet 1

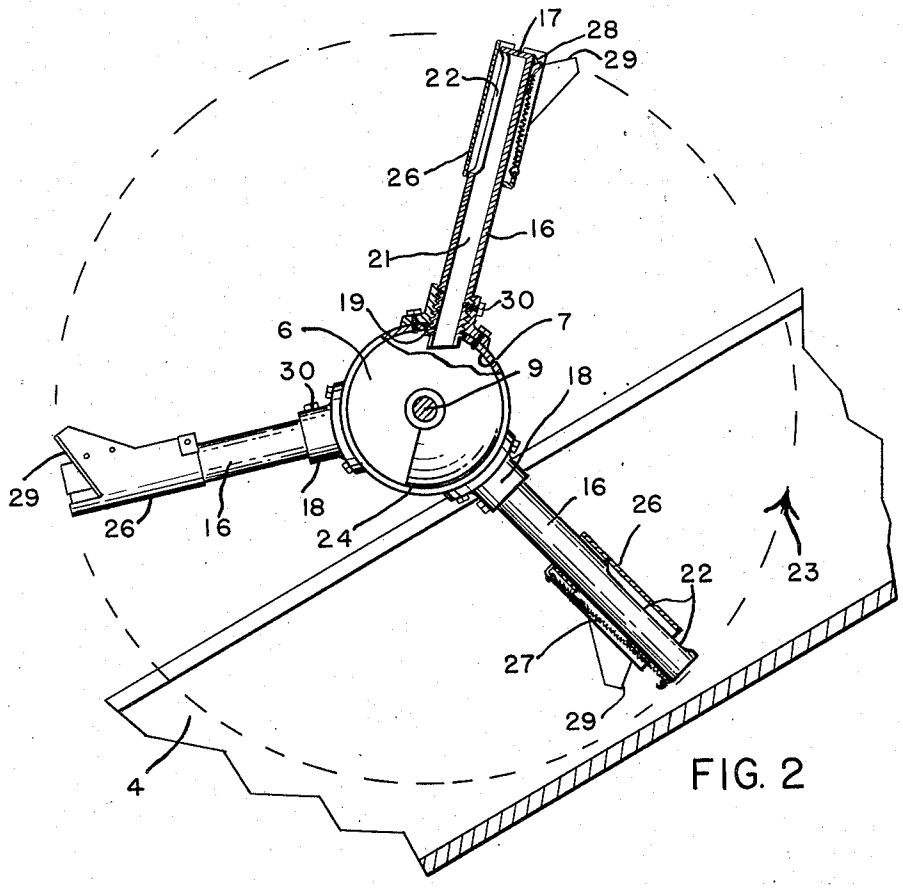


FIG. 2

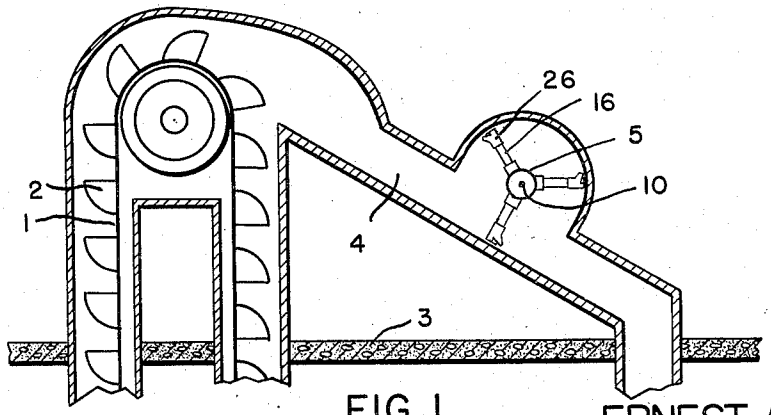


FIG. 1

INVENTOR.
ERNEST A. JOHNSON
BY
Richard P. Cardew
AGENT

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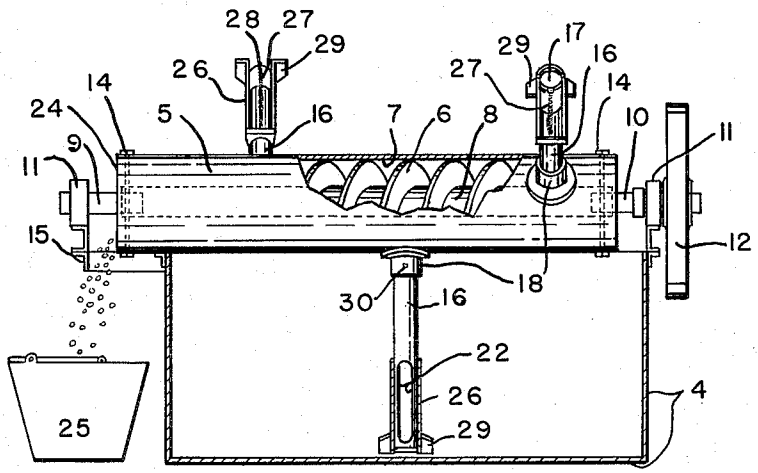


FIG. 3

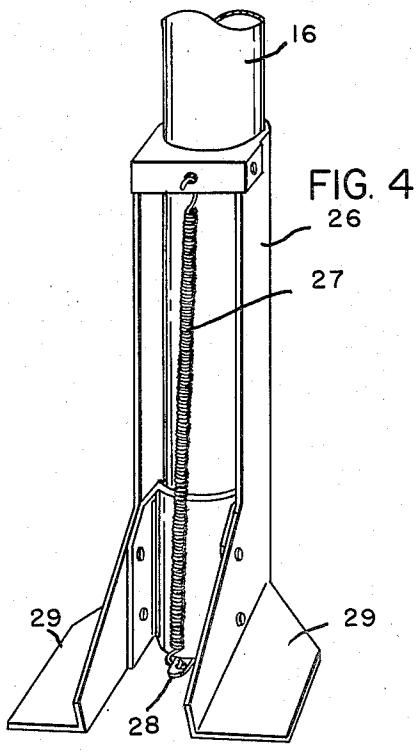


FIG. 4

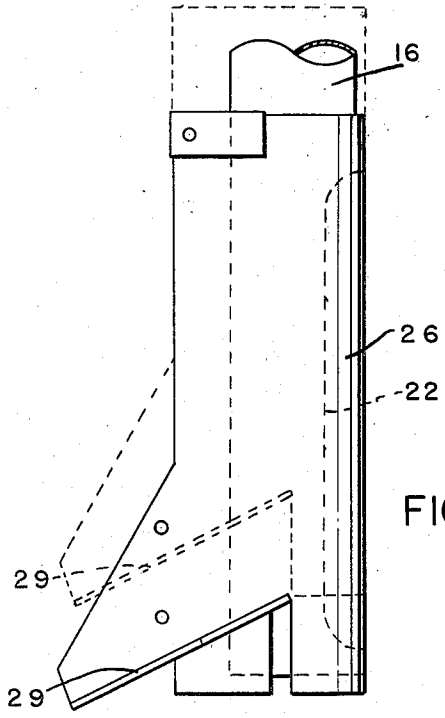


FIG. 5

INVENTOR.
ERNEST A. JOHNSON
BY
Richard P. Cardew
AGENT

Patented Jan. 5, 1954 2,664,751

UNITED STATES PATENT OFFICE

2,664,751

GRAIN SAMPLER

Ernest A. Johnson, Duluth, Minn.

Application January 11, 1951, Serial No. 205,577

3 Claims. (Cl. 73—422)

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This invention relates to a device for taking samples of granular materials, such as grain or the like, as it travels down an inclined chute.

One of the principal objects of my invention is to provide a device which may be mounted on a chute through which granular materials travel to automatically take a uniform or average sample of the material passed through the chute.

Another object is to provide a sample taker which automatically transmits the sample taken to a collecting point and discharges same into a receptacle or other receiving means.

Another object is to provide automatic means for regulating the size of the sample receiving opening in accordance with the depth of the grain passing through the chute.

Another object is to provide a sample device which is of simple construction and which is inexpensive to operate and maintain.

These and other objects and advantages will become more apparent as the description of the invention proceeds.

In the accompanying drawing forming a part of this application:

Fig. 1 is a diagrammatic view showing my invention installed on a grain chute.

Fig. 2 is an enlarged broken side elevational view partly in section showing the construction and mounting of the sample pick-up tubes.

Fig. 3 is a reduced front elevational view of Fig. 2 with parts broken away showing the invention installed on a chute.

Fig. 4 is an enlarged perspective view of one of the automatic closures for the pick-up tubes.

Fig. 5 is a side elevational view of Fig. 4.

In the drawing, the reference numeral 1 indicates a common grain handling elevator which has buckets 2 thereon which pick up grain from a supply below the floor 3, carry it up to the top of the elevator, and throw it into the chute 4 where my sampling device is mounted to secure an average sample of the grain being handled. The grain elevator, of course, is old in the art.

My sampling device comprises a major tube 5 which has a screw conveyor 6 mounted therein throughout substantially the entire length thereof, the screw 6 being of the same diameter as the inside diameter of the tube 5 so as to engage the inner walls 7 of the latter, as shown.

The screw 6 has an axial shaft 8 which is, preferably, hollow at each end to receive the stub shafts 9 and 10, which extend, in axial alined relation with the screw, outwardly of each end of the tube 5, as shown, where they are mounted in journals or bearings 11—11.

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The shaft 10 extends beyond its journal 11 to receive a power receiving pulley 12, which may be rotated by any suitable power source (not shown) to rotate the shafts 9 and 10, the screw 6 and the tube 5. It is to be noted that the tube 5, screw 6 and shafts 9 and 10 are all secured together to rotate simultaneously, preferably by means of a bolt 14 at each end of the tube which extends through each of the parts, as shown.

The sampling device is mounted over the chute 4 with one end of the tube 5 extending over or beyond one side edge of the chute 4 (see Fig. 3) and this end of the tube is open, the reason for which will become apparent. The journal for the shaft 9 is supported on a laterally extending bracket 15 carried by the chute.

Spaced in spiral relation around the periphery of the tube 5 are a plurality of pick-up tubes 16 which are secured to and extend radially from the tube 5, preferably as shown. The number of pick-up tubes which are used will depend on the size of the chute 4, the quantity of sample desired, and the amount of grain handled by the chute. I have here shown three pick-up tubes for purposes of illustration.

The pick-up tubes are, of course, hollow, and have their outer ends capped or closed as at 17. The inner ends of the pick-up tubes are preferably threadedly carried in a collar 18, which is secured to the tube 5 in any desired manner. The tube 5 has an opening 19 therein which is surrounded by the collar 18, as shown, so that the hollow channel 21 of the pick-up tubes 16 communicates with the hollow interior of the tube 5.

Adjacent the outer end of the pick-up tubes 16 is an elongated opening 22 facing the direction in which the tube 5 is rotated, the opening 22 of course being in communication with the passage 21.

In operation, with the sampling device mounted as shown and described, and the tube 5 rotating in the direction of the arrow 23, it will readily be seen that the pick-up tubes will be rotated so that their outer ends extend into the chute 4 to closely adjacent the bottom thereof (see Fig. 1) and, in so doing, they will pass through any grain which is traveling down the chute 4. The opening 22 will obviously receive some of the grain from the chute and permit same to enter the pick-up tube. As the device rotates further, the grain picked up through the opening 22 is transmitted down the channel 21 and finally is dumped into the interior of the tube 5. Here the grain is tumbled by the

screw 6 over to the open end 24 of the tube 5 where it falls out of the tube 5 into a receptacle 25 or a sample carrying chute, not shown.

Each of the pick-up tubes 16 picks up a sample in the same manner, and being spirally arranged on the tube 5, only one tube takes a sample at a time, and each of the tubes samples from a different section of the main chute 4. With the tube 5 being rotated at a uniform or constant speed, the sample obtained will be a true average of the grain passing through the chute.

To further insure a truly average sample being obtained, I have mounted on the tubes 16 an automatic closure for the openings 22, the closure comprising a sleeve 26 which is longitudinally reciprocable on the tube, the sleeve being of sufficient size and shape to normally completely cover the opening 22, as shown. The sleeve is biased to closing position by a spring 27 which is secured at one end to a lug 28 carried on the outer end of the tube 16, and at the opposite end to the remote or inner end of the sleeve 26. The sleeves 26 are preferably mounted on the tubes 16 so that they are a smooth sliding fit; that is, they are readily reciprocable but not loose enough to wobble to any extent. The lugs 28 serve to limit the outward movement of the sleeves 26 on the tubes 16, as may readily be seen from Fig. 4 of the drawing, by providing a stop against which the outer edge of the sleeve abutts.

As means to raise the closure sleeves 26, I have provided a pair of wing-like planar shoes 29—29, one on each side of the sleeves. The planes are positioned so that the major portion thereof trails behind the tube 16, as shown, and are disposed at an obtuse angle to the tube (see Fig. 5). The foremost portion of the shoes 29 is positioned above the lower end of the opening 22, and the shoes extend rearwardly and downwardly at an inclination.

It will readily be seen that as the tubes 16 are rotated into a flow of grain passing along the chute, the openings 22 will remain closed until the tube 16 is just about perpendicularly disposed in relation to the flow of grain, because the flow of grain hits or rides against the upper surface of the shoes 29 and this holds the sleeves down in their lowermost position over the opening 22. However, as the tube rotates further and reaches a substantially vertical relation with the flow of grain, the grain engages the under surface of the shoes 29 and applies upward pressure thereto forcing the sleeve upwardly, or inwardly, on the tube 16, thereby uncovering the opening 22 to permit grain to enter the tube as above described. The sleeve 26 obviously is raised or slid on the tube a distance equal to substantially the depth of the grain in the chute as the shoes will remain at substantially the upper level of the grain in the chute.

When this sliding sleeve is used, the grain which is picked up is a true cross section of the grain passing through the chute, as the opening 22 is not uncovered until the tube 16 is substantially vertically disposed in the grain. As the tube rotates further, the sleeve is moved outwardly closing the opening 22, the spring 27 serving to motivate the closing of the opening by the sleeve.

I have here shown the pick-up tubes 16 to be threadedly carried by a collar 18, and a set screw 30 is provided to prevent axial rotation of the pick-up tubes once they are installed on the housing 5. The threaded installation is preferred, however, as it permits interchanging of pick-up tubes as desired and ready replacement of worn parts.

Fig. 1 also illustrates a housing 31 which is built over my sample device to keep foreign matter out of the chute 4 and the sample.

It is deemed apparent that while I have here shown and described my sample taking device in connection with an inclined chute, the same is equally efficient and usable when used over a conveyor belt or the like, and the word chute in the appended claims should be construed to include a conveyor belt or the like.

Having thus described my invention, what I claim is:

1. A device for taking a sample of granular material which is passing along a chute comprising: a major tube mounted over said chute with its longitudinal axis perpendicular to the longitudinal axis of the chute, means to rotate said tube, a plurality of pick-up tubes extending radially from said major tube and having an opening adjacent their outer ends facing the direction of rotation of said tube, said openings facing the direction from which said material is flowing, said pick-up tubes having a channel therein in communication with the interior of said major tube and being of a length to extend into material carried on said chute and pick up a sample therefrom, and a closure mounted in sliding relationship on each of said pick-up tubes over said opening therein, means biasing each of said closures to closed position over said opening in said pick-up tubes, and inclined wall means extending laterally from said closures for moving said closures away from said opening in said pick-up tubes by the force of the moving material against said inclined wall means as they travel in said granular material.

2. A device for taking a sample of granular material which is passing along a chute comprising: a major tube mounted over said chute with its longitudinal axis perpendicular to the longitudinal axis of the chute, means to rotate said tube, a plurality of pick-up tubes extending radially from said major tube, said pick-up tubes being of a length to extend into said material and having an opening thereinto adjacent their outer ends and facing the direction from which said material flows and in the direction of rotation of said tubes to pick up material as they pass therethrough, said pick-up tubes having a passage therethrough and into said major tube whereby said material is passed into the latter from said pick-up tubes, and a screw mounted within said major tube throughout substantially the entire effective length thereof, said screw being of the same diameter as the interior diameter of said major tube, said screw being non-rotatable with respect to said major tube and rotatable therewith to convey said material to one end of said major tube and discharge same therefrom as said major tube and screw are rotated, and a closure mounted on and in sliding relationship with each of said pick-up tubes for opening and closing said opening in said pick-up tubes, and an inclined wall member carried by said closure for operating the latter as said member engages material moving along said chute and as said pick up tubes travel in said granular material.

3. A device for taking a sample of granular material which is passing along a chute comprising: a major tube mounted over said chute with its longitudinal axis perpendicular to the longitudinal axis of the chute, means to rotate said tube,

a plurality of pick-up tubes extending radially from said major tube and having an opening adjacent their outer ends facing the direction of rotation of said tube, said openings facing the direction from which said material is flowing, said pick-up tubes having a channel therein in communication with the interior of said major tube and being of a length to extend into material carried on said chute and pick up a sample therefrom, and a sleeve reciprocably mounted on each of said pick-up tubes, means biasing said sleeves over said opening in their respective tubes to close same, and inclined means carried on each of said sleeves to engage said material as said

pick-up tubes pass into said material to operate said sleeve to uncover said openings.

ERNEST A. JOHNSON.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,122,679	Carter	July 5, 1938
2,295,437	Thompson	Sept. 8, 1942
2,301,815	Robison	Nov. 10, 1942
2,327,123	Morse	Aug. 17, 1943
2,388,801	Roetman	Nov. 13, 1945