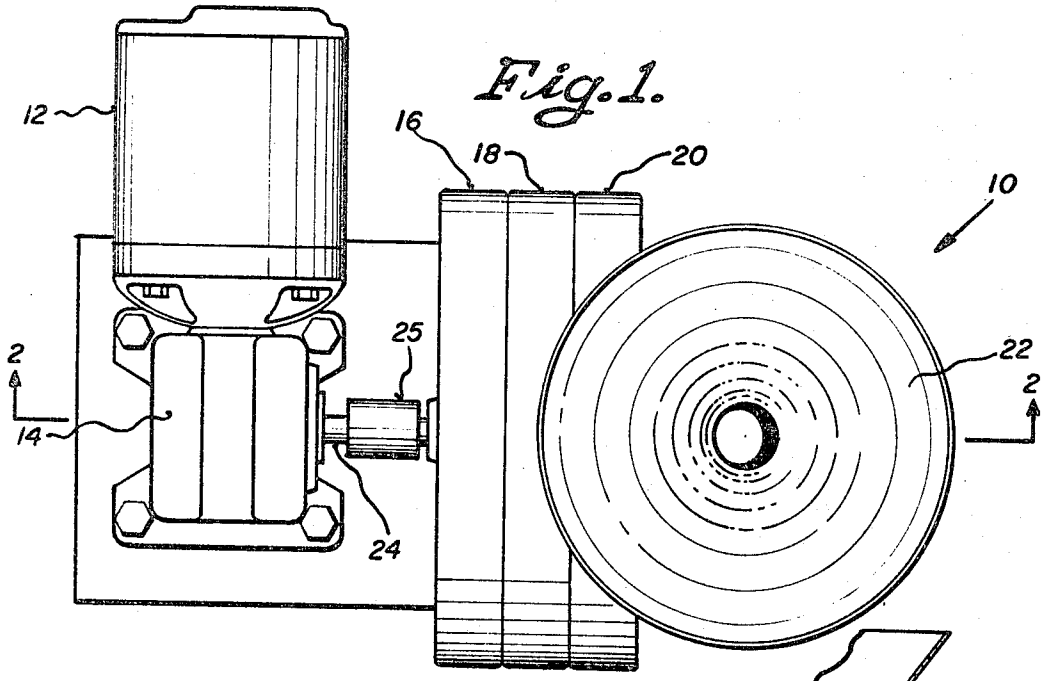
April 30, 1968 L. A. PAZANDAK 3,380,306

METHOD AND MEANS FOR DIVIDING AN AGGREGATE SAMPLE

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Fig. 1.



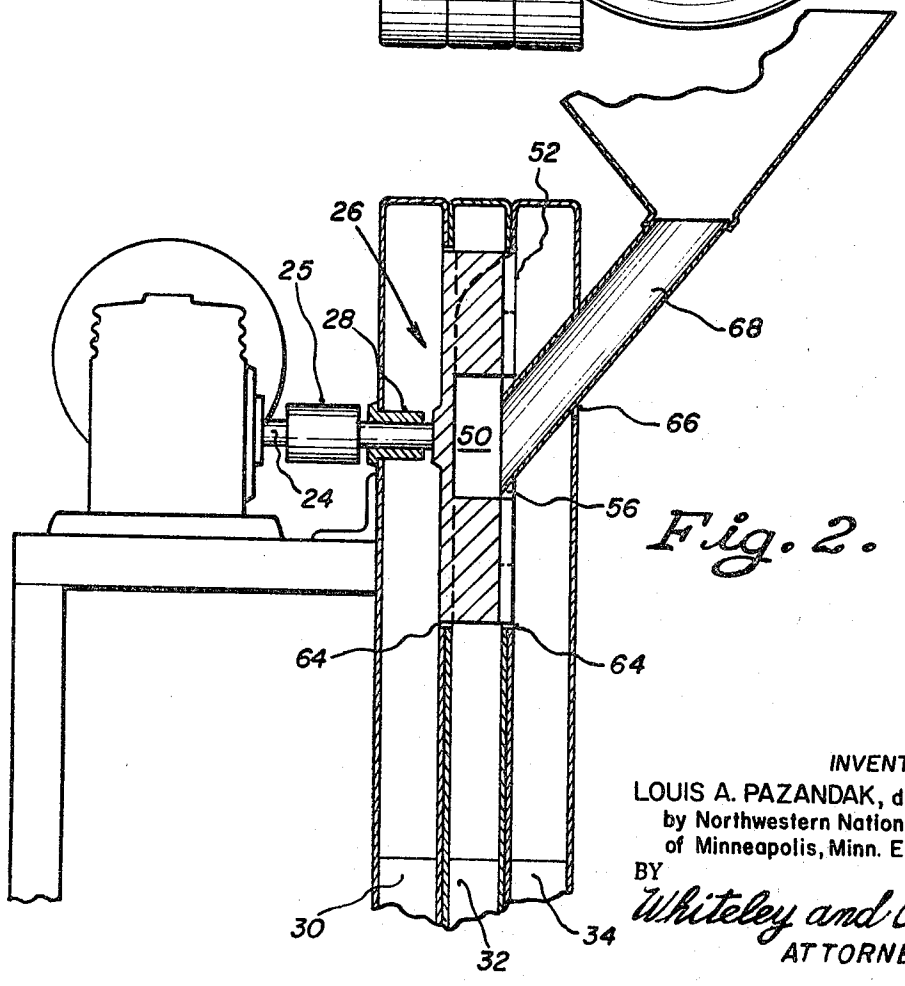


Fig. 2.

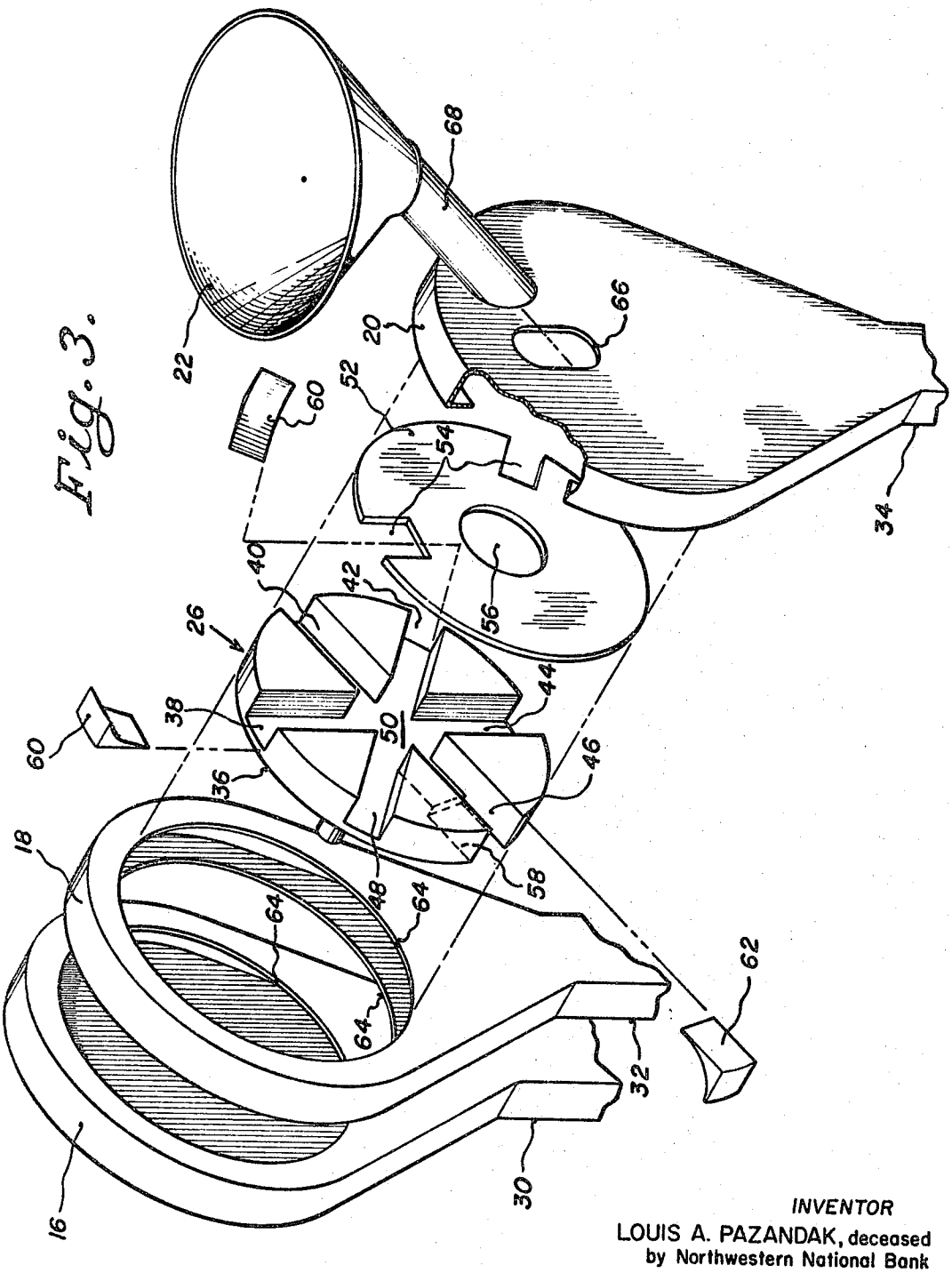
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BY
Whiteley and Caine
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Fig. 3.



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METHOD AND MEANS FOR DIVIDING AN AGGREGATE SAMPLE

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6 Claims. (Cl. 73—424)

This invention relates to the division of a quantity of granular aggregate into several fractional portions. More particularly the invention relates to the division of a grain sample into several amounts which represent substantially precise representative fractions of the entire sample.

After a sample has been extracted from a quantity of grain, it is often desirable to divide the sample into a number of smaller portions which are then analyzed to determine the quality of the grain. To obtain an analysis indicative of the quality of the entire quantity of grain being sampled, the portions into which the sample is divided must be representative of the composition of the entire sample. Grains are normally aggregates of particles of various shapes and sizes which have a tendency to stratify, making it difficult to divide a quantity into smaller portions which are representative of all components in the mixture. To evenly distribute all the components of a sample to several divisions thereof, it is therefore necessary to mix the aggregate as it is being divided.

Devices have been provided for dividing a sample of grain or similar material, but most such devices do not provide adequate mixing of the material as it is being divided, and others are capable of dividing a sample into only equal portions or into only two portions, and it is often desirable to divide a sample into several portions of varying size.

It is an object of the present invention to provide a method of dividing grain or a similar aggregate into several fractional portions to which all components of said aggregate are evenly distributed.

Another object of the invention is to provide a sample dividing apparatus which adequately mixes the material as it is being divided, and which is capable of dividing a quantity of grain or similar material into several unequal fractional portions.

Another object of the invention is to provide a method and means for accurately dividing a quantity of grain or similar material into several parts which represent substantially precise fractional portions of said quantity.

A further object of the invention is to provide a method and means for dividing a sample of grain or similar material into three portions representing unequal fractions of the whole, such as one-sixth, one-third and one-half of the total amount of said sample.

These and further objects and advantages of the present invention may become apparent from the following specification and claims, and from the appended drawings in which:

FIG. 1 is a plain view of a sample dividing apparatus embodying the present invention;

FIG. 2 is an enlarged vertical sectional view, taken on line 2—2 in FIG. 1; and

FIG. 3 is an exploded isometric view of a portion of the apparatus illustrated in FIG. 1.

Referring to FIG. 1, general reference numeral **10** indicates in its entirely a grain sample dividing apparatus, which includes a motor **12**, a speed reducing mechanism **14**, three grain collecting chambers, indicated at **16**, **18** and **20**, and an inlet funnel **22**. The apparatus is supported on a conventional leg framework, not shown. A

shaft **24**, driven by motor **12** through the speed reduction mechanism **14** is operably connected through a coupling **25** to a cylindrical impeller indicated in FIG. 2 by general reference numreal **26**. The shaft **24** is journaled in a bearing **28** located in a portion of the collecting chamber **16**. The impeller **26** is adapted to rotate in a vertical plane between the collecting chamber **16** and **20** and within the collecting chamber **18**, as shown in FIG. 2.

The collecting chambers **16**, **18** and **20**, as illustrated in FIG. 3, consist of interconnected parallel vertical walls which are circular in their upper portion and which taper in their lower portions where they are connected to delivery spouts **30**, **32** and **34**, respectively.

As illustrated in FIG. 3, the impeller **26** consists of a flat cylindrical member **36** into one face of which have been cut six rectangular, radially extending channels which are indicated in FIG. 3 at **38**, **40**, **42**, **44**, **46**, and **48**. The six channels are evenly spaced at 60° intervals and circumscribe and communicate with a common central space **50**. The six aforesaid channels are cut into the flat cylindrical member **36** at a depth equal to the width of the collecting chamber **18**.

A circular plate **52** is secured by means not shown, to the extended vertical surface of the cylindrical member **36** in covering relationship to the channels **38–48**. As shown in FIG. 3, rectangular notches or openings **54**, of a width equal to the width of the channels **38–48** are provided in the circular plate **52** to lie adjacent to channels **38** and **42**. A circular opening **56** at the center of plate **52** is of diameter equal to the cylindrical space **50**, which is circumscribed by the six evenly spaced channels **38–48**. A notch or opening **58** is provided in the member **36** within channel **46** on the side opposite from the plate **52**, and is of dimensions equal to the dimensions of notches or openings **54**.

Referring to FIGS. 2 and 3, two deflecting members **60** are disposed within the extended portions of channels **38** and **42**. Each of said members **60** is formed with a flat vertical surface secured to the member **36**, a curved extended edge lying on the periphery of the cylindrical member **36**, and a curved interior surface which is adapted to direct the flow of the material from the respective channels **38** and **42** through notches or openings **54** of the circular disc **52**. A similar deflecting member **62** is secured to the circular plate **52** to lie within channel **46** whereby the flow of material through channel **46** is directed by the curved interior surface of member **62** through the notch or opening **58**.

Referring to FIG. 2, concentric circular openings **64**, having a diameter equal to the diameter of the cylindrical grain impeller **26**, are provided in the parallel walls of collecting chamber **18** and in the interior walls of chamber **16** and **20** lying adjacent the openings in the walls of the central chamber **18**, whereby the cylindrical impeller **26** is disposed with one end in communication with the interior of collecting chamber **16**, one end in communication with the interior of collecting chamber **20**, and with its peripheral area in communication with collecting chamber **18**. A circular opening **66** is provided in the exterior wall of collecting chamber **20**. A tubular member **68** secured to the funnel **22** is inserted through opening **66** in collecting chamber **20** and opening **56** in the circular plate **52** to allow material to flow from funnel **22** into the central space **50**, as shown in FIG. 2.

The operation of the foregoing apparatus will now be explained. The motor **12** shown in FIG. 1 is energized to provide rotation of the impeller **26** through the gear mechanism **14**. A sample of grain to be divided is poured into the funnel **22**, whereby the grain flows downwardly through the tube **68** into the central space **50**, which is circumscribed by the six radially extending channels **38–**

48. The wedge-shaped portions of member **36** which lie between the aforesaid channels cause a mixing and dispersion of the material within the space **50** as the impeller **26** is rapidly rotated. The rapid rotation of the impeller causes the grain to be directed outwardly under centrifugal force through the several channels **38–48**, and since all of the channel openings which communicate with the central space **50** are of the same dimensions, and are evenly spaced about the axis of rotation, the grain is evenly divided among the six channels, one-sixth of the total sample entering each channel. The flow of grain through channels **40**, **44** and **48**, is unimpeded and the grain is directed through the openings which lie on the periphery of the impeller **26**, and is thereby directed into the center collecting chamber **18** which encloses the peripheral area of the impeller **26**, and is directed to the delivery spout **32**. The amount of grain which is collected from channels **40**, **44**, and **48**, and discharged from spout **32** is one-half of the total sample. Grain flowing from the mixing chamber **50** outwardly through channels **38** and **42** is deflected by the members **60** through the notches **54** in the circular plate **52**, and is directed into the collecting chamber **20**, wherein it travels downwardly discharging one-third of the total sample through delivery spout **34**. Grain flowing outwardly through the channel **46** is deflected by the curved interior surface of member **64** through the notched portion or opening **58** of member **36** and into collecting chamber **16**, wherein it travels downwardly discharging one-sixth of the total sample through delivery spout **30**.

An advantage of the present invention is in providing a method and means for dividing a quantity of grain or similar material into portions which are representative of the entire quantity of material being divided. Moreover, the invention provides a method and means for accurately dividing a sample of grain or similar material into portions which are substantially precise fractional amounts of the entire sample.

A further advantage of the invention is the provision of a method and means for dividing a sample of grain or similar material into several fractional portions which are of unequal quantity, but which are of a composition representative of the composition of the entire sample.

While a sample divider capable of dividing a sample of grain into portions equaling one-sixth, one-third and one-half of the total sample has been described, it should be understood that the description and appended drawings are illustrative of only one embodiment of the invention, that the apparatus may be provided with a greater or lesser number of channels to produce different fractional portions, or modified in other ways to similarly divide grain or other materials, and that therefore the invention is not limited to the specific disclosure, but is defined in the terms of the appended claims.

What is claimed is:

1. A method of dividing a quantity of aggregate into a plurality of representative fractional portions, comprising the steps of rotating a multiplicity of channels about a common central axis, admitting said aggregate to said common central axis while said channels are rotating for dispersion of said aggregate through said channels, and separately collecting the material flowing through at least two of said channels.

2. A method of dividing a quantity of aggregate into several representative fractional portions, comprising the steps of rotating a multiplicity of radially extending channels about a common central space, admitting said aggregate into said common central space while said channels are rotating to thereby divide said aggregate among said channels, and separately collecting the material flowing through at least three of said channels.

3. A sample dividing apparatus, comprising a rotatable member formed with a multiplicity of channels extending radially from a common central space, means for admitting an aggregate to said common central space while said member is rotating, and separate collecting means communicating with certain of said channels.

4. An apparatus for dividing a quantity of aggregate into representative fractional portions, comprising a plurality of separate collecting chambers for separately collecting each of said fractional portions, a multiplicity of channels radially disposed about a common central space with at least one of said channels communicating with each of said collecting chambers, means for rotating said channels about said common central space, and means for admitting said aggregate to said central space while said channels are rotating to disperse said aggregate through said channels and into said separate collecting chambers.

5. A sample dividing apparatus, comprising at least two collecting chambers formed with at least one opening in each chamber common to said openings in every other chamber, a rotatable member disposed within said openings and formed with a multiplicity of channels extending radially from a common central space, each of said channels communicating between said common central space and one of said collecting chambers, and means for admitting an aggregate into said central space while said member is rotating to disperse said aggregate through said channels into said collecting chambers.

6. A sample dividing apparatus, comprising a multiplicity of collecting members disposed in side-by-side relationship with each other, each of said collecting members formed with an opening common to the openings in the other members, a rotatably driven member disposed in the axis of the openings of said collecting members, said rotatably driven member formed with a multiplicity of channels extending radially from a common axis in the direction of the periphery of said driven member, at least one of said channels forming communication between said central axis and each individual collecting member, and means for admitting an aggregate to the central area of said rotatably driven member, whereby said aggregate is divided and portions thereof flow through said several channels to all of said collecting members.

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