June 1, 1965 H. W. KOGER 3,186,233

CONTINUOUS SAMPLING DEVICE FOR DRY GROUND MATERIALS

Filed Sept. 9, 1963 2 Sheets-Sheet 1

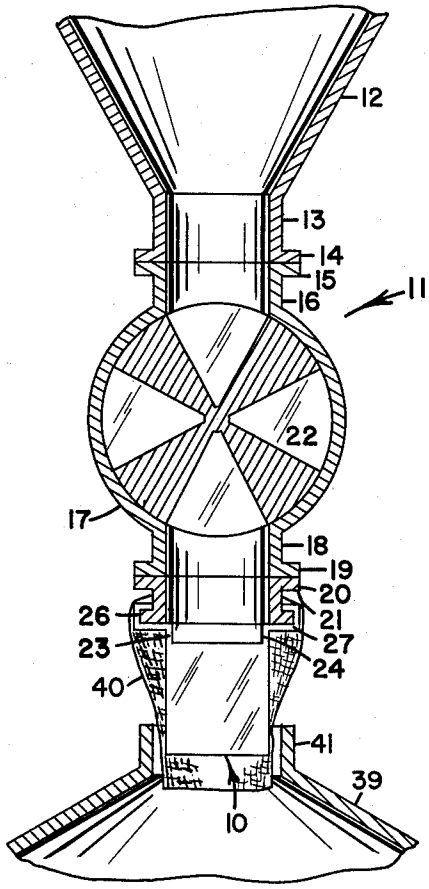


Fig. 1

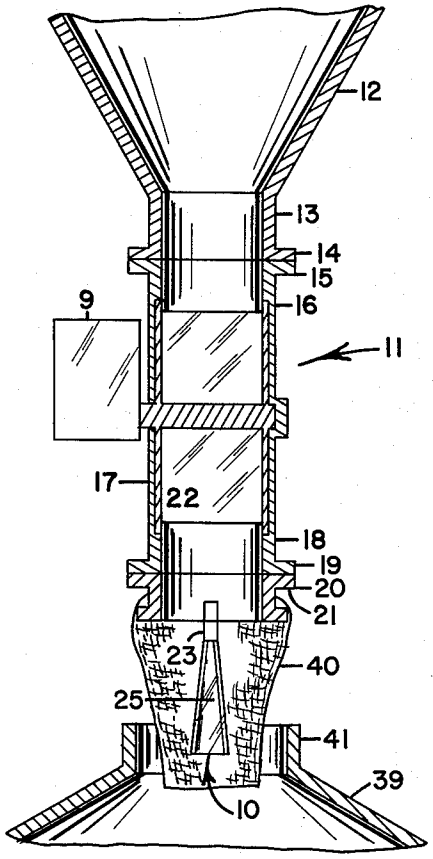


Fig. 2

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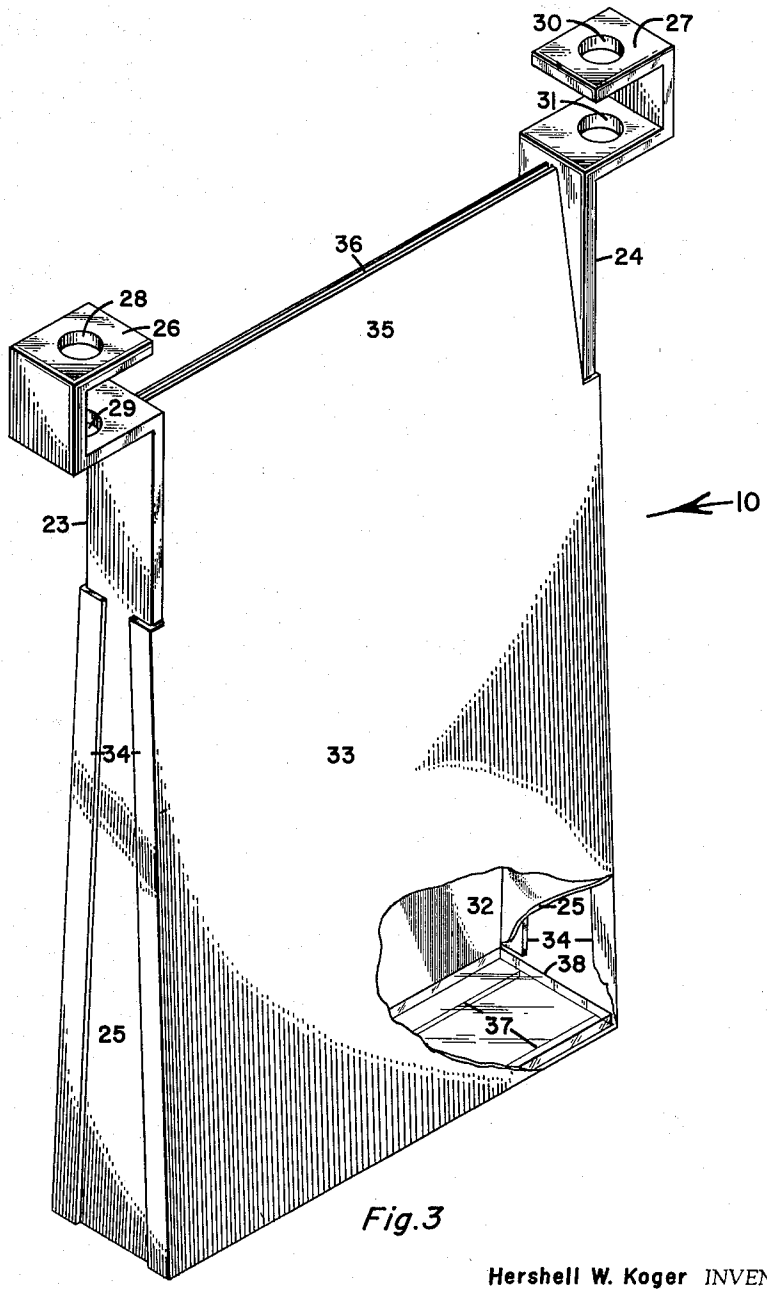


Fig.3

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United States Patent Office

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3,186,233

CONTINUOUS SAMPLING DEVICE FOR DRY GROUND MATERIALS

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1 Claim. (Cl. 73—421)

This invention relates to improvements in sampling devices that continuously collect samples of dry ground materials, such as an oxidizer for solid propellants, as such materials are fed into a supply bin prior to their inclusion into solid propellants.

The sampling device is positioned in the path of the dry ground materials in their free fall from the grinding apparatus into a supply bin. The dry material must be ground by the grinding apparatus to predetermined particle sizes; and the sampling device will, by collecting such particles, permit the visual inspection thereof to determine if the particle size of the dry material meets specifications.

Prior to the use of the sampling device embodying the present invention, no such device had been found that would give a definite sample of the dry materials being ground. The sampling device compensates automatically for variations of composition and is capable of delivering representative samples of the cross-section of a homogeneous stream of dry ground materials.

It is an object of the invention, therefore, to provide a sampling device that will continuously sample a free fall stream of dry ground, homogeneous materials and provide a true cross-section of such stream throughout the grinding operation of such materials.

It is another object of the invention to provide a sampling device having a precision-built inlet therefor that will sample the correct amount of dry materials that are being ground.

With the above and other objects and advantages in view, the invention consists of the novel details of construction, arrangement and combination of parts more fully hereinafter described, claimed, and illustrated in the accompanying drawings in which:

FIGURE 1 is a transverse sectional view of the metering valve of a grinding apparatus showing the manner of mounting the sampling device in the stream of dry ground material as it is being fed into a supply bin.

FIGURE 2 is a similar view but with the metering valve turned 90° from the position shown in FIGURE 1, and

FIGURE 3 is an enlarged perspective view of a sampling device embodying the invention, partly broken away, to more clearly show its manner of construction.

Referring more in detail to the drawings wherein like parts are designated by like reference numerals, the reference numeral **10** is used to generally designate a sampling device embodying the invention.

To illustrate the manner of use of the sampling device **10**, there is shown in FIGURES 1 and 2 a portion of a grinding apparatus **11**. The portion of the grinding apparatus **11** illustrated includes a discharge hopper **12** having a discharge throat **13** provided with an annular attaching flange **14** at the outermost edge thereof. Secured to the flange **14** of the discharge throat **13** in any well-known manner is an annular flange **15** of the inlet pipe **16** of a valve housing **17**. The valve housing **17** is also provided with an outlet pipe **18** having an annular attaching flange **19** at the outermost edge thereof.

There is secured to the flange **19** of the outlet pipe **18** a mounting ring **20** which is provided with an annular, centrally-located groove **21** which serves to operationally mount the sampling device **10**, as will be later described.

Mounted for rotation within the valve housing **17** is a metering valve **22**; and a small electric motor **9** for rotating the metering valve **22** is mounted on or adjacent to the valve housing **17**, as shown in FIGURE 2. As shown in FIGURE 1, the metering valve **22** will receive and discharge the ground material fed thereto from the hopper **12** simultaneously; and the metering valve **22** is so constructed that the inlet pipe **16** is never in direct communication with the outlet pipe **18** at any time. This is necessary so that, if suction is applied to the outlet pipe **18**, no ground material will pass through the valve housing **17** except that portion thereof that is to be fed into the outlet pipe **18** by the metering valve **22**. The electric motor **9** is controllable so that the rotation of the metering valve **22** can be varied as desired to, in turn, control the rate of discharge of the ground material through the outlet pipe **18**.

Referring to FIGURE 3, there is shown in detail the structure of the sampling device **10** which includes a pair of end-mounting brackets **23** and **24** respectively. The outer edges of the brackets **23** and **24** flare or diverge outwardly at the lower portions **25** thereof so that the lower portions **25** are substantially triangular in shape, as shown. Integral with the upper ends of the brackets **23** and **24** are substantially U-shaped retaining clamps **26** and **27** which are provided with aligned openings **28** and **29** respectively and aligned openings **30** and **31** respectively. Bolts may be extended through the aligned openings of the retaining clamps **26** and **27** to secure the mounting clamps **23** and **24** to the mounting ring **20** with the ends of the retaining clamps **26** and **27** extended into the annular groove **21** of the mounting ring **20**, FIGURE 1.

The sampling device **10** also includes a pair of side plates **32** and **33** respectively, and these side plates are secured to the lower portions **25** of the end brackets **23** and **24** by means of right-angularly-defined edge flanges **34** which may be made rigid with the lower portions **25** in any well-known manner.

At the terminus of the upper edges of the lower portions **25** of the end brackets **23** and **24**, the upper portions **35** of the side plates **32** and **33** converge toward each other to form a slit opening **36** which communicates with the interior of the sampling device **10**. The slit opening **36** is of a breadth of .040 inch, since this size of opening has been found to be the most successful in sampling the type of ground materials for which it has been designed. The opening **36** extends for the entire width of the sampling device **10**, and the opposing edges of the upper portions **35** of the side plates **32** and **33** are secured to the inner surfaces of the end brackets **23** and **24** in any well-known manner to retain the side plates **32** and **33** in rigid relation to each other with the breadth of the slit opening **36** remaining constant.

The bottom edges of the side plates **32** and **33** are also provided with inwardly-directed, right-angularly-defined edge flanges **37**, and these edge flanges **37** act as runways for a sliding bottom or access door **38**. The bottom **38** may be made of a clear transparent plastic material of which there are many available on the open market, or it may be made of Teflon. The lower edges of the flanges **34** on the side plates **32** and **33** being cutaway, as shown in FIGURE 3, to permit withdrawal of the bottom **38** as desired.

The sampling device **10** is a substantially-rectangular, wedge-shaped container which may be made of stainless steel or any other suitable metallic material. The side brackets **23** and **24** serving to mount the sampling device **10** on the mounting ring **20** that is secured to the valve housing **17** of a grinding machine, a portion of which is shown in FIGURES 1 and 2. The vibration of the grinding machine is transferred to the sampling device **10** by means of the side brackets **23** and **24**, thus preventing the ground dry material from bridging over the slit opening

36 and thus preventing the ground materials from entering the sampling device 10.

The sampling device 10 is positioned in the path of the ground dry materials as they fall into a supply bin 39, and a hood 40 of a flexible impervious material is also secured to the mounting ring 20 and extends downwardly into the throat 41 of the supply bin 39 in circumjacent relation to the sampling device 10.

When the sampling device 10 is full, it is removed and by sliding the bottom outwardly of the sampling device 10 the ground dry material collected thereby may be visually examined to determine if it is of the specified consistency.

There has thus been provided a sampling device that will obtain a continuous representation of the cross-section of the dry material being ground; and it is believed that the manner of use and the construction thereof will be apparent to those skilled in the art from the foregoing description. It is also to be understood that variations in the details of construction, arrangement, and combination of parts of the invention may be adhered to providing such variations fall within the spirit of the invention and the scope of the appended claim.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

A sampling device for positioning in the flow of dry

ground materials comprising a body that is of rectangular, wedge-shaped formation having a slit opening in the apex thereof to receive the dry ground materials therein, a sliding access door for the discharge of the dry ground materials therefrom, means for suspending said body within the flow of the dry ground materials, said means comprising a pair of end brackets having U-shaped mounting clamps on the free ends thereof and having the lower portions thereof of triangular shape, and said body comprising a pair of side plates having right-angularly disposed side and bottom edge flanges thereon whereby said side plates are secured to said end brackets and the access door for said body is slidably mounted in said body.

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