June 3, 1969 R. W. LANGTRY ET AL 3,447,381

SAMPLING MECHANISM

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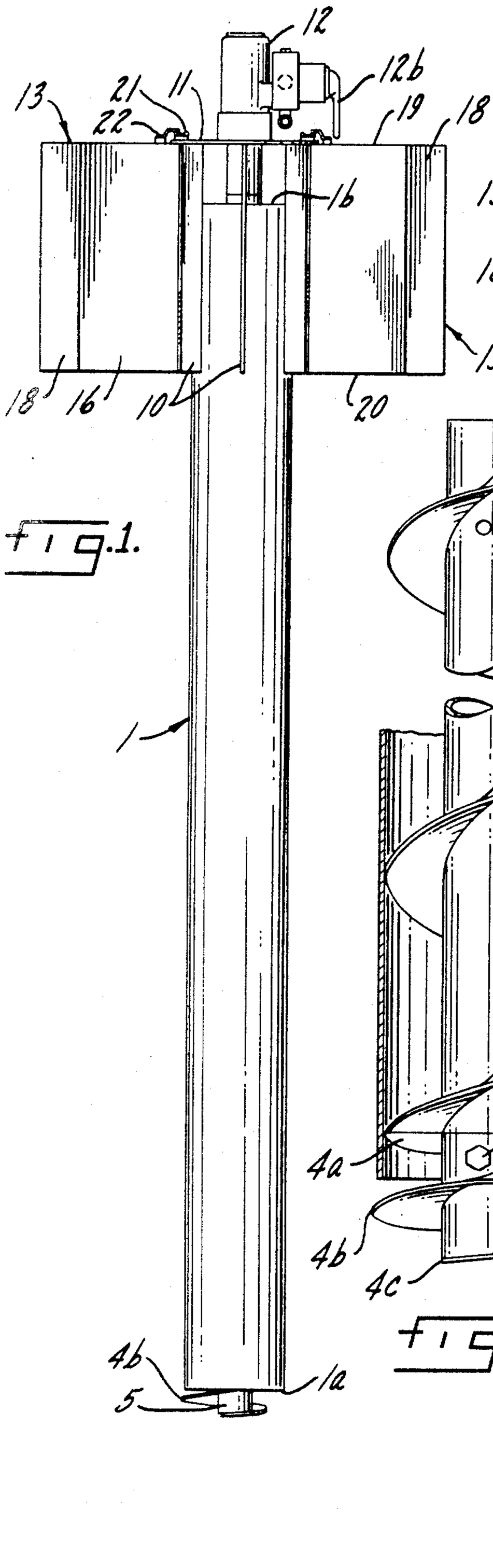

Fig. 1.

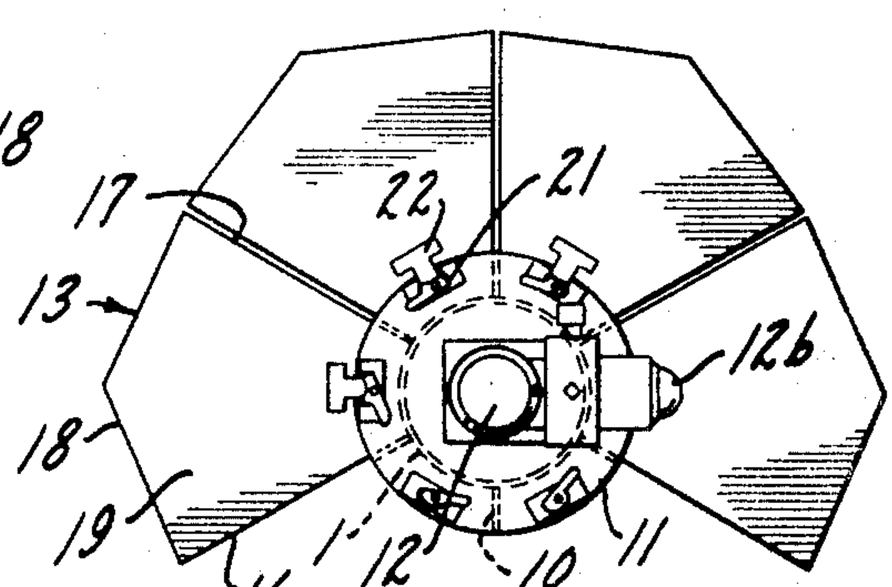

Fig. 2.

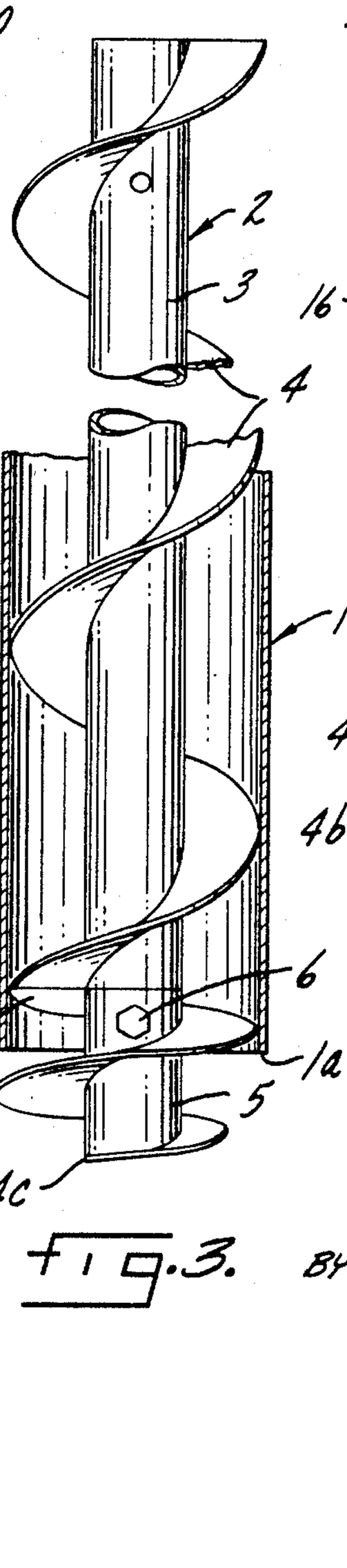

Fig. 3.

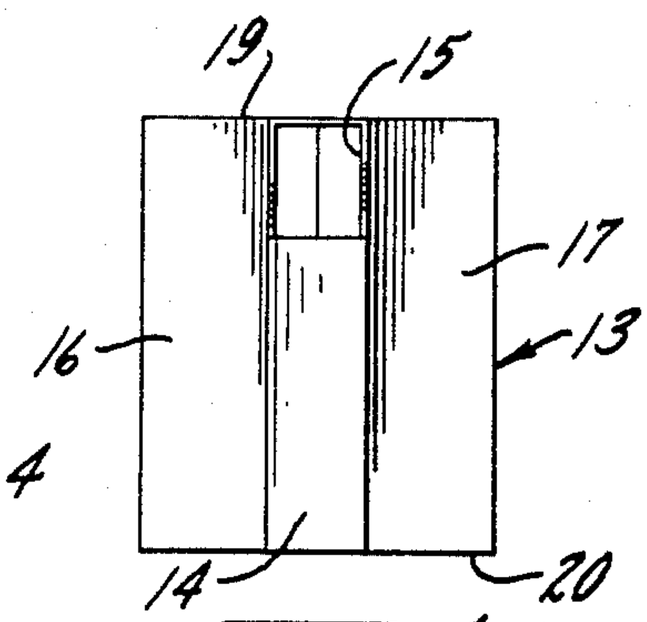

Fig. 5.

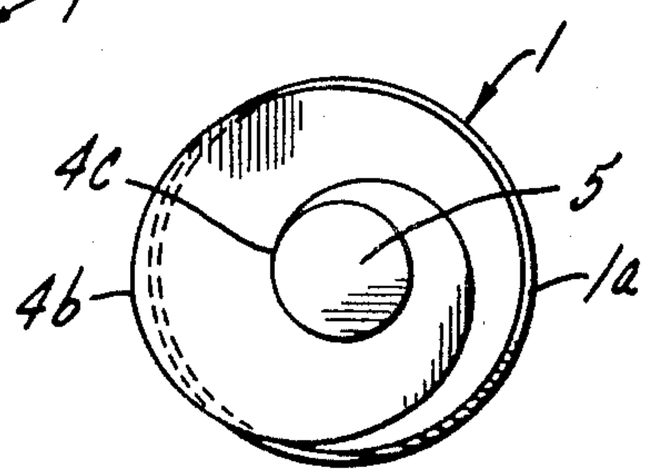

Fig. 4.

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SAMPLING MECHANISM

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5 Claims

ABSTRACT OF THE DISCLOSURE

A coal sampling device where a rotatable auger inside a tubular member carries the coal samples to receiving hoppers at the opposite end of the tubular member.

This invention relates to sampling mechanisms and has particular relation to a sampling assembly for use in acquiring samples of coal and the like.

Coal is tested, for example, upon its ability to produce British thermal units of heat. Samples are taken from each individual shipment or parts of shipments of coal and the samples are then reduced to minute quantities capable of testing. It is important that the sample taken from the shipment be representative thereof. With large shipments of coal, for example in railroad hopper cars, the taking of samples from the upper layers of coal in each or in random cars is subject to error resulting from the possible presence of batter coal in such upper layers. Accordingly, it is one purpose of the invention to provide a sampling assembly capable of acquiring samples from various layers within a railroad hopper car or the like.

Another purpose is to provide a simplified sampling assembly of minimum weight and of maximum economy in manufacture and use.

Another purpose is to provide a sampling assembly which can be manually employed.

Another purpose is to provide a sampling mechanism capable of accomplishing a penetration of material from which samples are to be taken.

Another purpose is to provide a sampling assembly having means effective to preclude clogging.

Another purpose is to provide a sampling assembly having removable hoppers.

Another purpose is to provide a sampling assembly capable of acquiring samples from different layers in a supply of material to be sampled.

Other purposes will appear from time to time during the course of the specification and claims.

The invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:

FIGURE 1 is a side elevation;

FIGURE 2 is a top plan view;

FIGURE 3 is a detailed view with parts broken away and on an enlarged scale;

FIGURE 4 is a bottom end view of a portion of the invention; and

FIGURE 5 is an end view of a portion of the invention.

Like parts are indicated by like numerals throughout the specification and drawings.

Referring now to the drawings, the numeral **1** generally designates an elongated, hollow, tubular member. Rotatable within the tube **1** is an anguer **2**. The auger **2** has a central shaft **3** and a serpentine auger blade **4** wound thereon. The shaft **3** has an end shaft portion **5** secured to its distal end by any suitable means, such as the fastener indicated at **6**. The shaft portion **5** extends beyond the open distal end **1***a* of the tube **1**. The auger blade **4** has a pitch and curve substantially standard throughout the major length of the tube **1**. A portion **4***a* of the blade **4**, however, which is attached to the end shaft portion **5**, has a pitch substantially flatter than that of the blade portion **4**. A segment of auger blade portion **4***a* has an outer diameter greater than the inner diameter of tube **1**, as indicated at **4***b*. The diameter of blade portion **4***a* diminishes from the point **4***b* to its end as indicated at **4***c*. It will be observed that the blade **4**, and that segment of portion **4***a* within the tube **1**, have outer diameters substantially equal to the inner diameter of tube **1**, there being only sufficient space between the peripheral edge of the auger blade and the inner surface of the tube **1** to preclude scraping.

A plurality of axially parallel guide bars or vanes **10** are circumferentially spaced about the outer surface of tube **1** at its end **1***b* opposite the end **1***a*. The bars **10** extend beyond the opposite open end **1***b* of the tube **1** to support a plate **11** outwardly beyond the end **1***b* of tube **1**. Plate **11** is thus perpendicular to the axis of tube **1** and has a diameter substantially greater than tube **1**.

Thus there is created a series of circumferentially positioned openings, each defined by a set of adjacent vanes **10**, the end **1***b* of tube **1** and the plate **11**. Supported on plate **11** is a hydraulic motor means **12** having a driving connection with auger shaft **2**. It will be understood that the auger blade **4** terminates adjacent the end **1***b* of tube **1**.

Circumferentially positioned about the end portion of tube **1** adjacent the end **1***b* thereof is a plurality of receiving hoppers **13**. Each of the receiving hoppers **13** has a generally arcuate inner end wall **14** as shown in FIGURE 5. The wall **14** has an aperture **15** formed therein for alignment with one of the openings defined by the blades. **10**, plate **11** and edge **1***b* of tube **1**.

Side walls **16**, **17** are secured to the opposite edges of inner end wall **14** of each hopper **13** and extend in diverging planes from wall **14**. An outer end wall **18** may be conveniently formed of converging portions extending from the outer edges of walls **16**, **17**. Each of the hopper elements has upper and bottom walls **19**, **20**.

Secured to the outer surface of plate **11** and circumferentially spaced thereon adjacent the periphery thereof are a plurality of latch members **21**. Each of the upper walls **19** of the hoppers **13** carries a latch pin member **22**. As best seen in FIGURES 1 and 2, lock elements **21**, **22** are positioned for engagement when the hopper **13** is in place on the tube **1** to retain the hopper **13** thereon. It will also be observed that the side walls **16**, **17** of each hopper **13** are arranged for engagement with and fit snugly between a pair of adjacent bars **10**. Thus the bars **10** and walls **16**, **17** are radially disposed with respect to the axis of tube **1**.

Whereas there has been shown and described an operative form of the invention, it should be understood that this showing and description are to be taken in an illustrative or diagrammatic sense only. There are many modifications in and to the invention which will be apparent to those skilled in the art and which will fall within the scope and spirit of the invention.

The use and operation of the invention are as follows:

It will be understood that any suitable source of hydraulic pressure may be connected to the hydraulic motor 12 in any conventional manner. The assembly shown in FIGURE 1 is placed upon the upper layer or surface of the supply of coal or other material to be sampled. The manually operable control handle **12***b* of the hydraulic motor **12** is then operated to actuate motor **12** which in turn produces rotation of shaft **2** and auger blade **4**, **4***a* within and externally of the tube **1**. Samples of the material to be tested are thus acquired by the blade portion extending beyond the open end **1***a* of tube **1**. The sample size thus acquired is controlled by the space between the outer surface of shaft end portion **5** and the

inner diameter of the opening 1*a* of tube **1**. Similarly, the height or thickness of such samples is controlled by the space between adjacent, axially aligned portions of auger blade segment 4*a*. Since the pitch and spacing between such adjacent blade portions is increased beyond the blade portion 4*a*, it will be understood that any sample particle acquired by the auger blade portion 4*a*, and thus delivered into the open end 1*a* of tube **1**, will flow easily through the tube **1** without jamming.

The auger portion extending beyond tube **1** serves to "dig" into the material to be sampled, drawing the sampling assembly thereinto. The larger diameter blade segment indicate at 4*b* insures the formation of a path or channel sufficient to permit free passage of tube **1** and the protection of the open end 1*a* thereof as the tube **1** moves deeper into the material to be sampled.

The sample particles are thus conveyed through the tube **1** and expelled outwardly through the openings circumferentially spaced about and beyond the edge 1*b* of tube **1** and thus through the openings **15** in the hoppers **13** for collection within said hoppers.

The penetration of the material to be sampled can be controlled by holding the assembly thereagainst, the samples thus including only material from levels or layers penetrated. When sufficient samples have been thus collected within the hoppers **13**, the same may be easily and simply removed from the tube **1** by disengagement of lock means **21**, **22** and removal of the hoppers **13** from the tube **1**. If desired, the removed hopper may be replaced with a fresh empty hopper and the operation reinstituted to acquire additional samples from adjacent or lower locations within the material. The hoppers **13** are then taken to a laboratory or other suitable location, at which point the samples present therein are removed for such further treatment and testing as may be desired.

There is claimed:

1. A sampling assembly comprising an elongated, hollow, tubuar member, an auger extending rotatably through and beyond one end of said member, a support carried entirely by and beyond the opposite end of said tubular member, driving means carried entirely on said support and having a driving connection with said auger, and hopper means removably carried entirely by said support and positioned to receive materials conveyed

through and beyond said opposite end of said tubular member by said auger, said hopper means comprising a plurality of hopper members circumferentially spaced about and removably carried by said tubular member.

2. The structure of claim **1** characterized by and including a plurality of circumferentially spaced, radially disposed bar members secured to the outer surface of said tubular member and extending beyond one end thereof, said support being secured to the outer ends of said bar members.

3. The structure of claim **2** wherein said hopper means comprises a plurality of hopper members, each of said hopper members being positioned between a pair of adjacent bar members and removably secured to said support.

4. The structure of claim **1** wherein said auger includes a continuous auger blade having portions of closer spacing at and beyond said one end of said tubular member, the remaining portions of said blade within said tubular member being of wider spacing whereby particles conveyed into said tubular member by said first-named portions will be conveyed to said hopper means without jamming.

5. The structure of claim **1** wherein said hopper means includes a hopper member having an arcuate end wall, a pair of side walls diverging from said end wall, an opposite end wall joining said side walls and an opening positioned in said arcuate end wall to receive sample material from the tubular member.

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