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Stern

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[54] **JIG FOR THE PREPARATION OF COAL**

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[51] **Int. Cl.** **B03b 3/26**; B03b 3/28

[58] **Field of Search** 209/425–427, 209/468, 500, 455–457, 44

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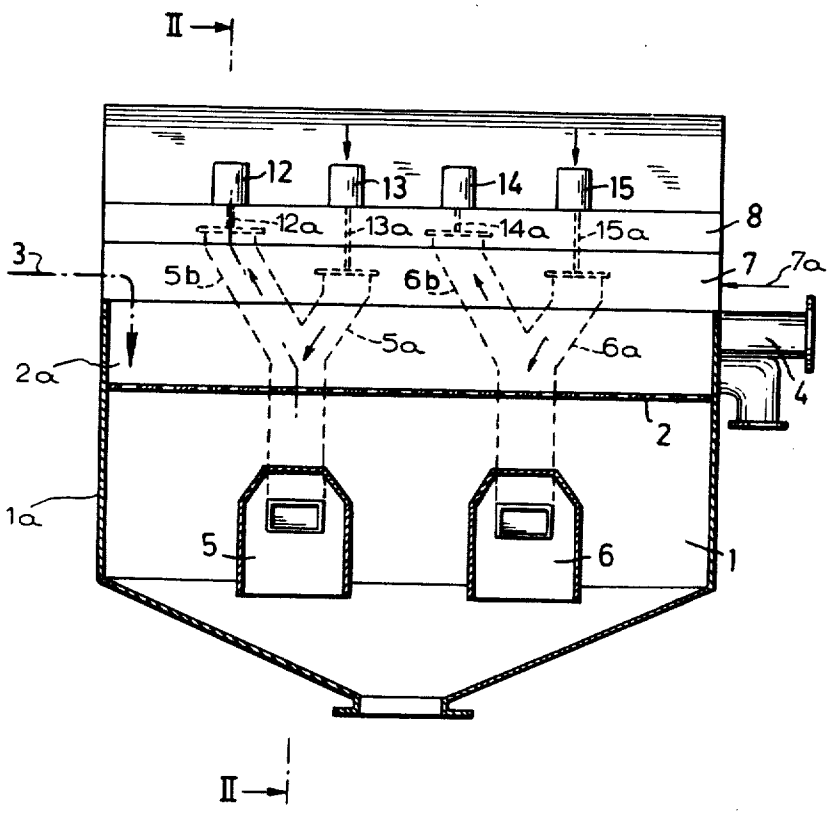
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Attorney, Agent, or Firm—Hill, Gross, Simpson, Van Santen, Steadman, Chiara & Simpson

[57] **ABSTRACT**

A mechanism known to the art as a jig for the preparation of a material such as coal including a housing for containing the coal in water and having a horizontal settling sieve member therein with a coal inlet and with outlets, and having an air inlet beneath the sieve controlled by a valve for pushing the coal and water upwardly in a pulsating movement and having an air outlet conduit leading from beneath the sieve with the conduit having discharge lines controlled by intermittent valves and leading to a manifold with the flow from the manifold controlled by a throttling valve.

10 Claims, 2 Drawing Figures



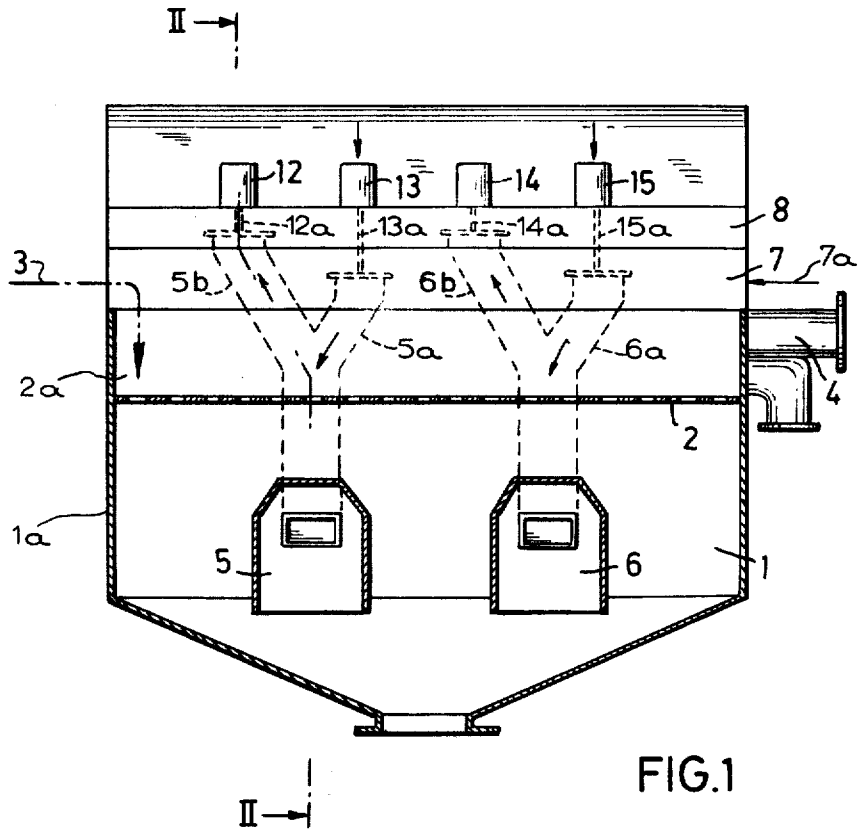


FIG.1

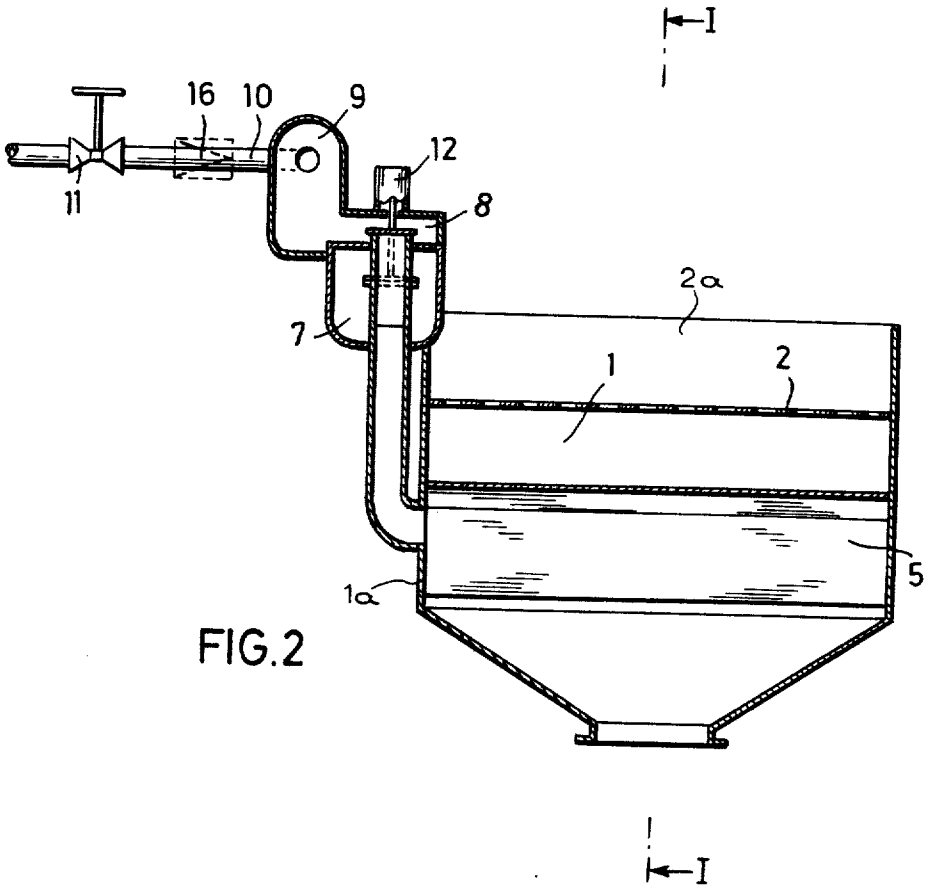


FIG.2

JIG FOR THE PREPARATION OF COAL

BACKGROUND OF THE INVENTION

The invention relates to a jig for the preparation of coal or other minerals in which a settling sieve is employed and in which air is used for causing relative movement of the liquid and material relative to the sieve and chambers within the housing of the apparatus.

Wet settling tanks of the type known as jigs operate with pulsating quantities of water which carry and float the material to be prepared above a settling sieve. The pulsation of the water is produced by the admission and discharge of air into chambers below the sieve, which chambers are open at the bottom and are in communication with the interior of the housing below the sieve and below the water carrying the material to be prepared. While it will be understood that the principles of the invention may be employed with advantage for various minerals and other materials, advantages are particularly obtained in use with coal, and the invention will be primarily described in that environment. For example, if coal is brought to the surface and foreign material is not excessive in quantity or type, it may be loaded directly into transportation facilities for the market. However, coal from most seams requires preparation to provide a desired and uniform quality. Various types of washing or separation devices have been used for cleaning the coal which generally operate on the basic principle of the difference in specific gravity between the coal and foreign material. The coal is floated or carried relative to a separating sieve, and the foreign material being heavier, descends relative to the coal.

In the jigs of the type which employ air in a housing having a settling sieve, disadvantages have been encountered in that the settling operation is not fully thorough, and insufficient movement of the liquid and coal is encountered. In addition upon discharge of the air through the operating valve from the air chambers, there is an undesirable amount of noise generated.

It is accordingly an object of the invention to provide an improved method and apparatus for a jig which achieves an improved settling operation, and which avoids disadvantages of structures heretofore available.

In accordance with the principles of the invention, a number of air chambers are provided within the housing of the jig with a common exhaust air conduit connected to the discharge of the control or operating valves. This common air conduit has at least one adjusting member for regulating the speed of escape of the air. In this common escape air conduit, a pressure equalization takes place. The amount of pressure release is controlled from the air escape conduit and in all air chambers a uniform escape speed of air occurs so that a uniform drop in water level within the settling tank results in a uniform settling operation. This settling operation is thus controlled by actuation of the adjusting valve relative to the characteristics of the material being processed.

With the provision of the common manifold or air escape conduit, and the single control valve, a dampening of the noise which occurs upon the escape of the air from the air chambers is attained. In addition separate adjusting members are provided for regulating the escape of air or the speed of discharge of the air from the individual conduits leading to the single manifold. With

the use of a throttle valve for controlling the escape of air, the speed of movement of the pulsating water in the settling tank is controlled in an improved manner and control can be obtained without interruption of continuous operation.

Other objects, advantages and features, as well as equivalent structures and methods which are intended to be covered hereby, will become more apparent with the teaching of the principles of the invention in connection with the disclosure of the preferred embodiment in the specification, claims and drawings, in which:

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic elevational view shown partially in cross-section, of a settling tank constructed and operating in accordance with the principles of the present invention; and

FIG. **2** is a vertical sectional view, shown in somewhat schematic form, with the section taken substantially along line II—II of FIG. **1.**

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. **1** and **2** show a jig having a housing **1**a with a settling area **1** therein. Extending horizontally within the chamber within the housing **1**a is a settling sieve **2.** This sieve extends generally horizontally in the direction of material flow through the housing. The material such as coal is delivered through the inlet at **3** to the area **2***a* above the settling screen. The sorted material is removed from an outlet **4.**

Below the settling sieve **2** are air chambers **5** and **6** which extend across the settling portion **1** and open downwardly. Beside the housing **1**a extends an air admission conduit **7.** Also extending along the housing is a common air escape conduit or manifold **8.** The air escape manifold leads to an offtake or discharge chamber **9** which connects to a discharge pipe **10.** In the discharge pipe **10** is a variable controllable throttle valve **11** which can be regulated during operation to control the release of air from the housing **1***a*. Also connected to the discharge pipe **10** is a pressure relief valve **16** as will be described later herein.

The downwardly facing open air chambers **5** and **6** have air delivered to them through conduits **5***a* and **6***a*. These conduits connect to the air admission conduit **7** which is supplied with pressurized air through an air supply line **7***a*. **7***a* will be connected to a suitable compressor or other means for providing air under pressure at the volume required.

The flow of air from the admission conduit **7** into the individual lines **5***a* and **6***a* is regulated by pulsating operating valves **13** and **15.** These valves are shown schematically with control rods **13***a* and **15***a* leading to the valves between the lines **5***a* and **6***a* and the conduit **7.** The discharge or escape of air from the chambers **5** and **6** occurs through discharge lines **5***b* and **6***b*. These lines communicate with an air escape conduit **8,** and the flow into the conduit is controlled by pulsating valves **12** and **14** which have control rods **12***a* and **14***a*.

To cause a pulsation of the compressed air flowing into the air chambers **5** and **6** and to cause the water level to be raised and dropped, the operating valves **12** through **15** are operated interchangeably. When compressed air is admitted to flow into the air chambers, the water level is raised in the settling portion **1.** The

water level will drop, when the compressed air is released to flow out through the opened operating valves **12** and **14** into the common air escape conduit **8.**

However, before the air is released into the atmosphere, it is controlled in the manifold **8** and throttled or restricted to flowing off gradually. This is accomplished by the corresponding adjustment of the throttle valve **11.** This regulation of the speed of release of the air from the manifold controls the settling operation above the settling sieve **2.** This also insures that the pulsating water flowing back at the end of the settling thrust does not flood the operating valves and thereby penetrate into the manifold **8.**

A minimum pressure must be maintained in the air chambers **5** and **6** which acts as a counter-pressure to the pressure that results from the height of the liquid level in the settling portion **1.** This minimum pressure is normally regulated by controlling the operating cycle of the valves **12** and **14.** While controls are not shown by the valves **12** and **14** and the for the valves **13** and **15,** it will be appreciated by those versed in the art that this control may be obtained by conventional mechanical or electrical controllers which cause periodic or cyclic operation of the valves.

Control of the minimum pressure in the housings **5** and **6** may be also obtained by the use of the pressure valve **16** which will be open during normal discharge of air through the air escape conduit **8,** but will close upon attainment of the minimum pressure. Thus, the setting of the relief valve **16** will determine such minimum pressure.

The opening for the pressure valve is sufficiently small so that it does not fully release the pressure in the manifold during normal operation, but the valve **11** functions to primarily control the throttling of air pressure from the exhaust manifold. The opening for the valve **16** can, therefore, stay open during normal operation but will close only to retain a minimum pressure.

I claim as my invention:

1. A jig for the preparation of material such as coal comprising in combination:

a housing for containing material in water and having a settling sieve member therein with a material discharge opening and a material intake opening;

an air inlet means for delivery of air under pressure into a space below the sieve member;

an air outlet means for discharging air from said space so that air will move the material and water in the housing relative to the sieve member;

and an air flow valve means connected to said air outlet for controlling the rate of escape of air through said air outlet,

and valve means including an intermittently operating pulsating valve and a throttle valve downstream a sufficient distance from the intermittent valve to permit expansion of gas leaving said pulsating valve.

2. A jig for the preparation of a material such as coal constructed in accordance with claim **1:**

wherein said air outlet means includes plural conduits controlled by said throttle valve.

3. A jig for the preparation of a material such as coal constructed in accordance with claim **2:**

wherein each of said conduits is controlled by an individual pulsating valve.

4. A jig for the preparation of a material such as coal constructed in accordance with claim **2:**

wherein each of the conduits is controlled by an individual pulsating valve and the conduits lead to a manifold with said throttle valve controlling the flow of air from the manifold.

5. A jig for the preparation of a material such as coal constructed in accordance with claim **1:**

wherein said air inlet means includes a plurality of conduits.

6. A jig for the preparation of a material such as coal constructed in accordance with claim **1:**

and including a pressure valve in said air outlet closing at a minimum pressure in the jig outlet.

7. A jig for the preparation of a material such as coal constructed in accordance with claim **1:**

and including an expansion chamber between said pulsating valve and said throttle valve.

8. A jig for the preparation of a material such as coal constructed in accordance with claim **1:**

and including a minimum pressure relief valve connected to said air outlet means and closing to prevent the excess flow of air at a minimum pressure within the area below said sieve.

9. A jig for the preparation of a material such as coal constructed in accordance with claim **1:**

wherein pulsating valve means are connected to said air inlet means and to said air outlet means for causing movement of the material within the housing relative to settling sieve.

10. The method of controlling the flow of air through a jig for the preparation of a material such as coal wherein the settling tank includes a housing with a settling sieve therein and an air inlet and an air outlet for a space below the sieve which comprises the steps of:

directing air at a pressure into the air inlet, intermittently relieving the air, expanding and throttling the intermittently released air flow through the outlet at a controlled rate.

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