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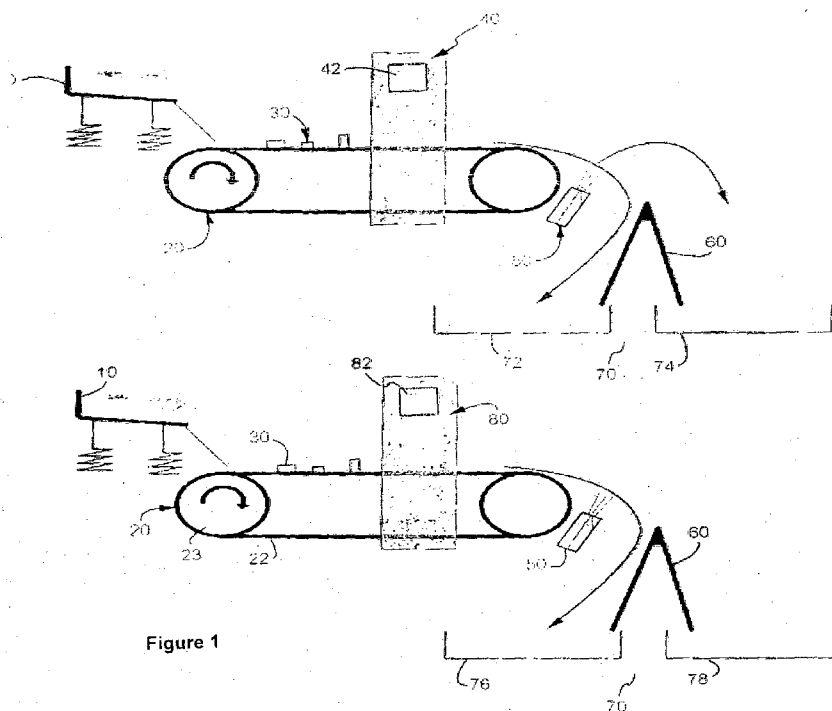


Figure 1

(57) Abstract: The invention is a dry coal separation system containing a conveyor (20) carrying a stack of the tuvenane coal (32) on it; a separation apparatus (50) in which tuvenane coal (32) is separated from foreign bodies (34). System has an x-ray apparatus (80) aligned on a band (22) in the conveyor (20) so as to allow the detection of a first grade coal (36) and at least a second grade coal (38) according to a combustion efficiency of the coal (30) from separation device (50).

DEVICE FOR SEPARATION OF DRY COAL

TECHNICAL FIELD

- 5 The invention relates to the arrangements for the separation of the dry run of mine coal extracted from the quarry, in particular the allocation of values determining the quality of combustion.

BACKGROUND OF THE ART

- 10 In order to remove foreign objects from run of mine coal extracted from the quarry, optical systems and mechanical devices are used. Optical systems analyses tuvenane coal which is passed from conveyor with the aid of a camera or other colour sensing device in real-time and materials having a colour different from the
15 colour of black will be identified and separated from coal with the aid of mechanical apparatus. Mechanical apparatus works on the basis of orientation of the object widely separated conveyor with an air blower assembly into a separate basket.

- Japanese patent number JP7253398 refers a fast and precise measurement with a
20 method of formation binaries to obtain a grey gradient by taking samples in order to determine the density of the coal and examining under a microscope image. Intensity is digitized in proportion to the grey level distribution.

- US7542873B2 refers to a performance processing system for the determination of
25 particle density and size distribution by supplying X-ray image and processing of the coal to the. Before the input and output of the material to the processing system, issues such as a density separator medium are determined by evaluating the material parameters. Parameters such as material properties are determined by comparing the characteristic of the image which is set in advance with the
30 characteristics of the resulting image. If the image is obtained as a result of Radiation transfer through the material, the accuracy is being developed by determining the thickness of the material.

SUMMARY OF THE INVENTION

On the basis of the prior art, the invention is the separation of coal according to its quality in dry coal separation process of simple and practical way.

- 5 To achieve the mentioned objectives, the invention is a dry coal separation system including a conveyor on which a pile of tuvenane coal is carried, and separation device for tuvenane coal to be separated from foreign bodies that it contain. Separation system includes an x-ray apparatus aligned on a belt conveyor to allow the detection of a first quality coal and at least one second quality coal according to
10 the combustion efficiency of the coal from the separation assembly. In this case, the image of dry coal fed to the conveyor depending on the ratio of organic material is determined and thus classified so that the first or second quality is available. Second grade coal is a representative identification. First quality coal with a value below the threshold defined by the other threshold values is determined and the second, third,
15 fourth grade coals classified as herein are referred to as second-quality coal.

A preferred embodiment of the invention comprises at least one mechanical separator set on the band, in order to guide into a first quality coal container corresponding to first quality coal detected by x-ray device and at least one second
20 grade coal and at least one second coal quality vessel. Mechanical separator directs the relevant coal particle to the corresponding first or second grade coal vessel in accordance with the fixation performed by the x-ray apparatus. Thus, the separation process using the values obtained by the x-ray device provides separation of coal to the graded quality values.

25 In a preferred embodiment of the invention, the mechanical separator comprises a blowing element. Blowing element removes the coal for example, carried on an intermittent band by blowing air and directs easily to corresponding position.

30 A preferred embodiment of the invention contains a receiver on which beam passes through coal by the x-ray device falls and a microprocessor which is configured to process one image of the coal detected by the recipient. The image obtained from the receiver with the microprocessor is processed and in comparison with pre-set threshold values, a piece of coal which is subject to processing, is guided into the

appropriate field for the resulting value

A preferred embodiment of the invention contains one signal generator activated when the threshold value is exceeded for information on the colour of the mechanical separator, which is set by the microprocessor. Signal generator directs the separator element, for example blowing element, towards in a direction intersecting processed coal part and the desired coordinates with predetermined rate.

In a preferred embodiment of the invention, the receiver is being configured to generate different colour information for the organic and inorganic components. In this way, the coal can be separated easily for the corresponding quality according to the type or types of colours obtained by the receiver or the weight percent of this.

A preferred embodiment of the invention contains one optical system to which the separation device where tuvenane coal is processed is connected and running the separation assembly in the event of detection the colours other than black colour. Optical system provides separation of foreign elements other than coal from tuvenane coal that cannot be detected by x-ray.

DESCRIPTION OF THE DRAWINGS

Additional features and advantages of the present invention will be seen from exemplary embodiments which reference to the accompanying drawings.

Figure-1 is a schematic illustration of an alternate embodiment of the separation system of the inventive dry coal representative.

REFERENCE NUMBERS

10 Box	60 Reagent
20 Conveyor	70 Containers
22 Band	72 Coal Container
23 Drive Element	74 Foreign Body Container
30 Coal	76 First Grade Coal, Container
32 Run-Of Mine Coal	78 Second Grade Coal, Container

34 Foreign Body	80 X-Ray Device
36 First Grade Coal	82 X-Ray Generator
38 Second Grade Coal	84 Receiver
40 Optical System	86 Microprocessor
42 Camera	90 Mechanical Separator
50 Separation Device	
52 Blowing Element	

DETAILED DESCRIPTION OF THE INVENTION

In Figure 1 one representative embodiment of the coal separation system of the invention is schematically shown. The system is basically works in a two-stage.

In the first stage tuvenane coal (32) contained in the casing (10) is being transmitted to a conveyor (20). Conveyor (20) comprises one band (22) on which coal (30) is laid and a drive member (23) that moves the band (22). The upper part of the starting end of movement of the conveyor (20) faces the mouth of the casing (10) and under opposite the tip motion end the containers (70) are available. Thus, tuvenane coal (32) spilled from the casing (10) lading on the band (22) starts to move towards a container (70). On the conveyor (20), an optical system (40) is placed so as to face the tape (22). Optical system (40) includes a camera (42) included. Camera (42) monitors the tuvenane coal (32) on the band (22) and if there is a body with one colour other than black in this, by defining one foreign body (34) with the aid of a separation apparatus (50) provides separation from coal (30). Separation apparatus (50) comprises a blower illustrated in the figure. The blower in the separation apparatus (50) is placed so as to face the band (22) at the end of the band (22). It estranges the foreign body (34) determined by the camera (42) by targeting it during the passage in front of it so as to make a projective motion from the tape (22) by blowing air. An inverted V shaped a separator (60) is fixed at the endpoint of the band (22). Foreign bodies (34) expelled by the separation device (50) are collected in a foreign body container (74) by breaking the far barrier of reagent (60). Coal (30) is directly collected in a coal container (72) with the aid of the closed wall of the reagent (60).

In the second stage, coal (30) collected in the coal container (72) is placed in the casing (10) to separate basing on the quality. A conveyor (20) with a similar structure to that of the first stage is still is arranged at the bottom in front of the casing (10). At the last end of the conveyor (20) container (70) is still available at the bottom which is facing the two wall of the separator (60) in a manner similar to the first stage. Container (70) has two vessel for one of the first quality coal vessel (76) and one second quality coal vessel (78). On the conveyor (20) an x-ray apparatus (80) facing to the tape (22) is provided. X-ray apparatus (80) comprises an x-ray generator (82) and receiver (84) provided below the band (22) so as to collect its rays passing from coal (30). The receiver (84) is associated with the a microprocessor (86) so as to provide signalling.

When the coal (30) carried on the band (22) is passed by x-ray means (80), it is illustrated green according to the proportion of organic components contained in and according to inorganic components in red by the receiver (84). Obtained colour ratio is processed with the help of the microprocessor (86) and according to the pre-determined proportion of red and green colour; the coal exposed to x-ray (30) is defined as the first quality coal (36) or second grade coal (38). Accordingly, the described first or second grade coal (36, 38) is sent to corresponding first or second grade coal container (76, 78) with the help of a mechanical separator (90). In the second stage the mechanical separator (90) includes a blower.

The inventive system means a device that performs processing steps consisting in the first stage, the purification of tuvenane coal (32) from foreign bodies (34); subsequently in the second stage, the identification of the coal which is set according to the predetermined amount of organic or inorganic material with the aid of x-ray device (80) as a first grade or the second grade coal (36, 38), according to the obtained definition, orientation to the corresponding container (76, 78) with the help of a mechanical separator (90). It is obvious that by determining a large number of the amount of organic or inorganic material threshold, the coal (30) can be divided into more than two qualities and second grade coal (38) determines more than one class.

CLAIMS

1. A dry coal separation system containing a conveyor (20) carrying a stack of the tuvenane coal (32) on it; a separation apparatus (50) in which tuvenane coal (32) is separated from foreign bodies (34) and characterized by having an x-ray apparatus (80) aligned on a band (22) in the conveyor (20) so as to allow the detection of a first grade coal (36) and at least a second grade coal (38) according to a combustion efficiency of the coal (30) from separation device (50).
2. A coal separation according to Claim 1 and characterized by having at least a mechanical separator (90) set on the band (22) to guide the first grade coal (36) and at least a second grade coal (38) detected by x-ray apparatus (80) to corresponding a first quality coal vessel (76) and at least one second quality coal container (78).
3. A coal separation according to Claim 2 and characterized in that the mechanical separator (90) contains a blowing element.
4. A coal separation according to any of the above mentioned claims and characterized by having a receiver (84) on which the beam passing through the coal (30) fall by x-ray device (80) and a microprocessor (86) configured to process the image of the coal (30) detected by the receiver (84).
5. A coal separation according to Claim 4 and characterized in that mechanical separator (90) comprises a signal generator that activated when a colour information threshold value set by the microprocessor (86) is exceeded.
6. A coal separation according to Claim 5 and characterized in that the receiver (84) is configured to generate different colour information according to organic and inorganic components.
7. A coal separation according to any of the above mentioned claims and

characterized by having one optical system (40) to which the separation device (50) where tuvenane coal is processed (32) is connected and running the separation assembly (50) in the event of detection the colours other than black colour.

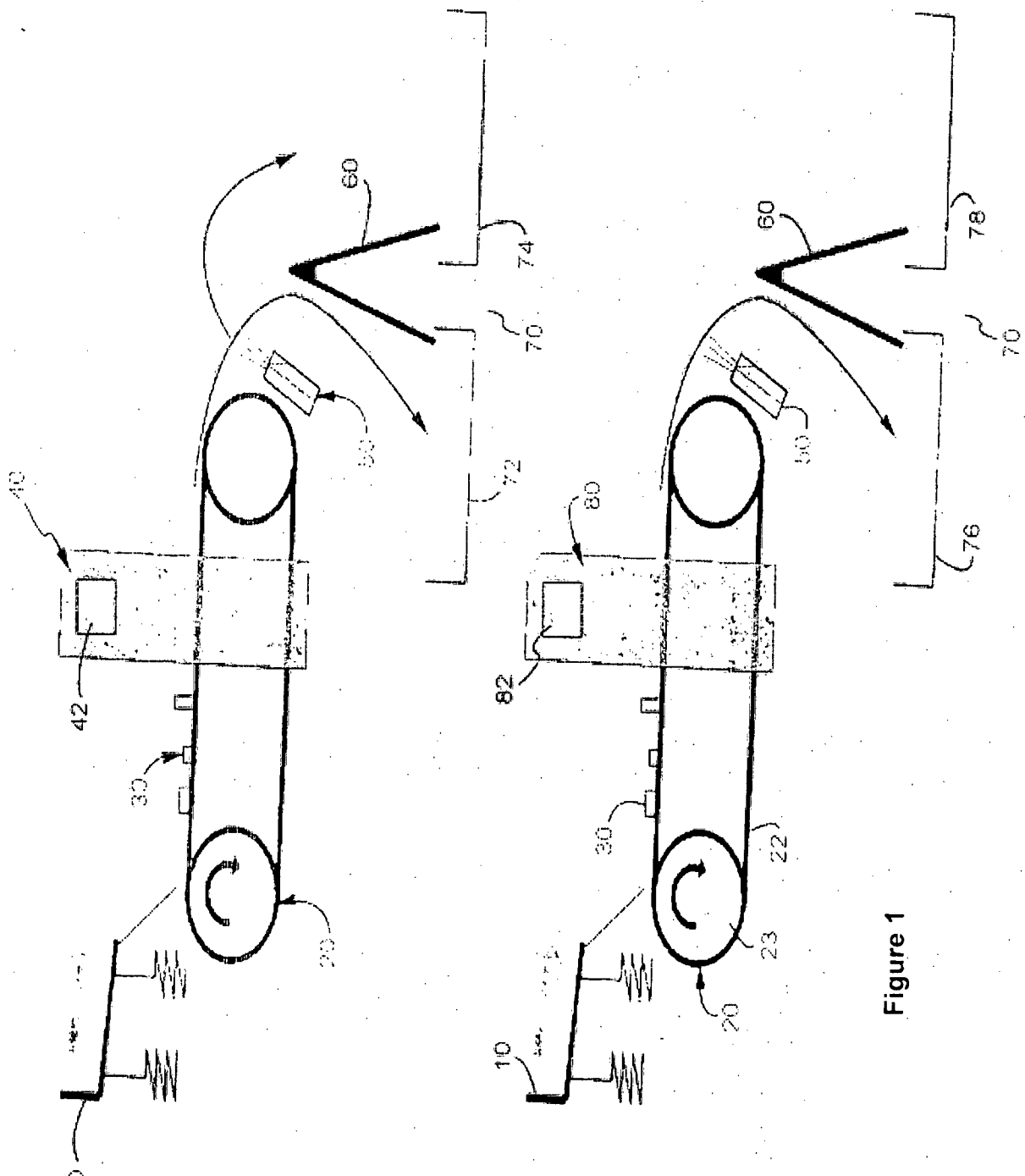


Figure 1