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[54] **PROCESS FOR DRESSING ASBESTOS ORE WASTE**
10 Claims, 2 Drawing Figs.

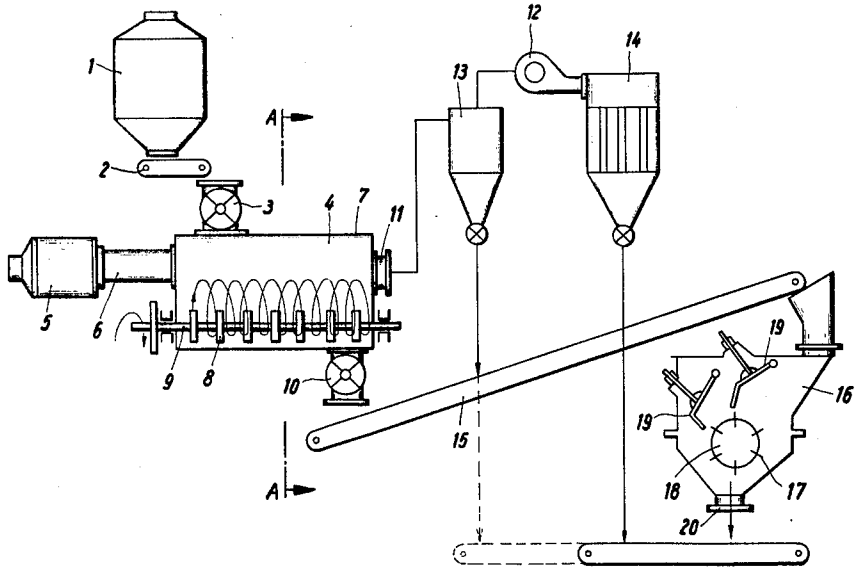
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[51] **Int. Cl.** **B27k 7/00,** B27L 9/00, B27L 11/00
[50] **Field of Search** 241/4, 18, 19, 27, 29

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ABSTRACT: A process for dressing asbestos ore waste in which the waste material is dried by whirling it through a stream of hot gas to prevent encrustation of the material during the drying process and to separate at least some of the asbestos fibers from the ore waste and by subsequently comminuting the material in an impact breaker to separate substantially all remaining fibers from the ore and the fibers from each other.



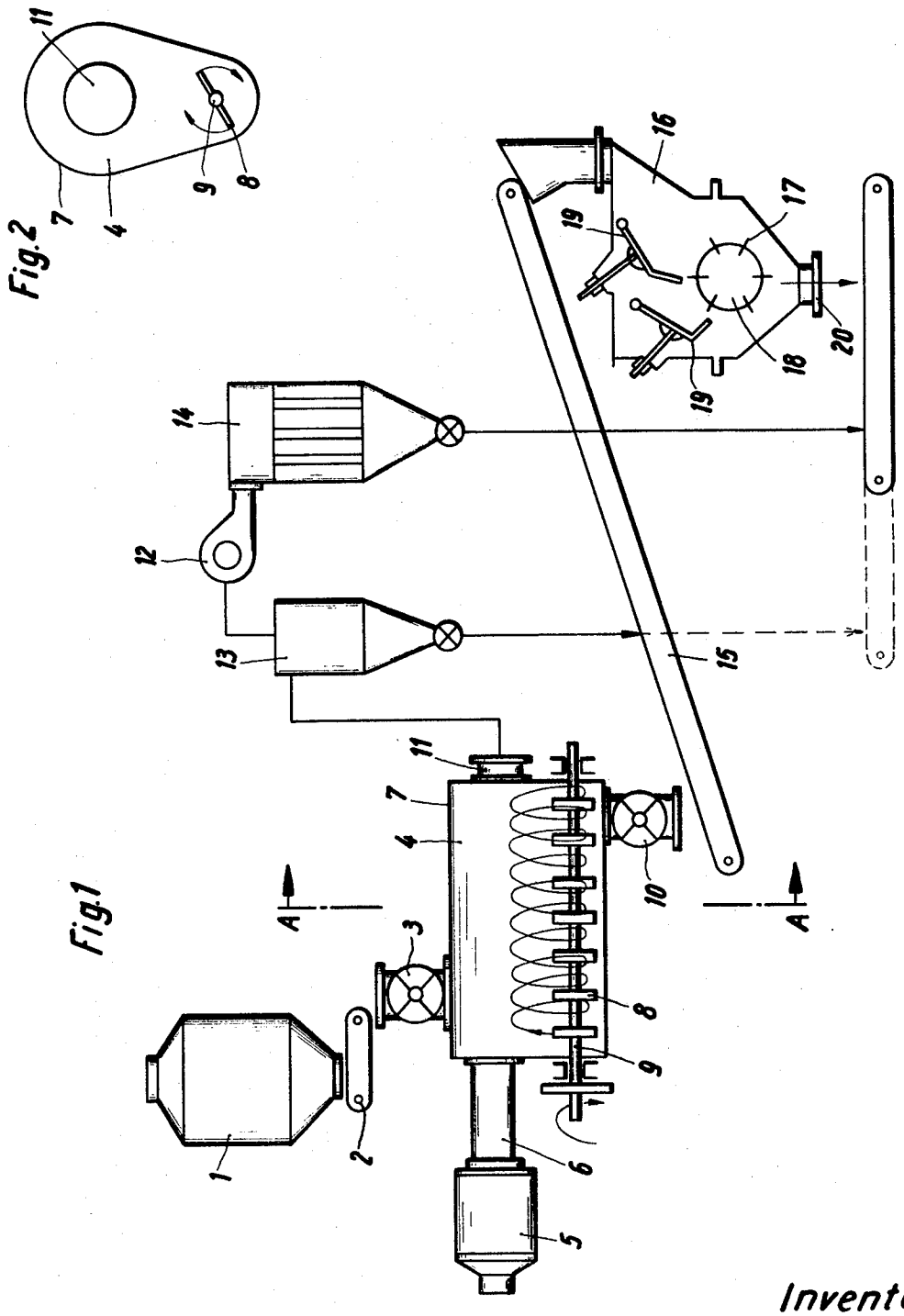


Fig.2

Fig.1

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PROCESS FOR DRESSING ASBESTOS ORE WASTE

BACKGROUND OF THE INVENTION

The present invention relates to a process for dressing asbestos ore, and especially asbestos ore waste resulting from commonly used ore dressing processes known in the art. Such asbestos ore waste or tailings consists of comminuted gangue of asbestos ore with which usually very short fibers still contained therein are so intimately mixed that an economic separation of the fibers from the ore has so far not been possible.

The asbestos fibers are, as well known, embedded in form of veins or clusters in the bedrock. To recover these asbestos fibers from the rock, the rock is precrushed and dried and subsequently thereto subjected to a multistep crushing and sieving operation to thus free the clusters of asbestos fibers, the so-called copses from the bedrock. The fibers in the clusters thus obtained are still connected into hard, almost stonelike bundles and must be separated from each other further in special fiberizers, that is the bundles must be separated into individual asbestos fibers. For this purpose fast running impact crushers with tiltably mounted and resiliently supported impact plates are especially suitable.

In previously used methods of dressing asbestos ore, the separation of the asbestos from the bedrock and opening of the copses was done in such a manner that a noticeable part and particularly short asbestos fibers have been rejected with the tailings as waste. Since the proportion of asbestos fibers to the bedrock is in asbestos ore relatively small, the waste from the dressing process, known as tailings, is considerable and all over the world asbestos mines have accumulated large piles with millions of tons of waste which still contain an appreciable amount of asbestos fibers.

Since the demand for short asbestos fibers has considerably increased in recent years, numerous attempts have been made to redress the accumulated asbestos ore waste to separate the short fibers contained therein from the actual waste material. Such attempts have, however, not met with success, since an economical separation of the short fibers which form with the more or less sandlike crushed bedrock and other material in the waste piles, an intimate mixture has not been possible. The present invention is based on the recognition that the main cause for the failure of such attempts is to be found in the previously used drying process of the material in which drying drums have been used and in which the intimate mixture of the miniature copses and the gangue was largely preserved and in which during drying of the moist, earthy fines adhering to the asbestos ore waste an encrustation of the latter occurred which made subsequent separation of the asbestos from the actual waste material in the impact breaker more difficult.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide for a process for dressing asbestos ore waste in such a manner that the asbestos fibers still contained in the ore waste may be separated from the waste and recovered.

It is a further object of the present invention to provide for such a process which can be carried out in a very economical manner.

With these objects in view, the method according to the present invention for dressing asbestos ore waste mainly comprises the steps of drying asbestos ore waste in a stream of hot gas while subjecting the waste to forceful agitation so as to whirl the waste through the gas stream to thereby separate some of the fibers from the ore waste and by subsequently comminuting the material in an impact breaker to separate substantially all remaining asbestos fibers from the gangue and the fibers from each other.

The asbestos ore waste is preferably dried to a moisture content of about 1 percent and the hot gas used for drying has preferably a minimum temperature of 500° C.—900° C.

The forceful agitation of the asbestos ore waste during the drying process is preferably carried out by mechanical means and for this purpose the ore waste may be fed more or less continuously into one end of an elongated substantially horizontally arranged container through which a stream of hot gas is passed from the one to the other end of the container while the ore waste is subjected to the action of fast rotating impact members arranged in the bottom region of the container so that the ore waste is repeatedly upwardly thrown in the container and transported by the gas stream from one to the other end of the latter.

By drying the material in the aforementioned manner an encrustation of the material is prevented and the subsequent complete separation of the asbestos from the gangue in an impact breaker is greatly enhanced.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a schematic illustration of apparatus used for carrying out the method according to the present invention; and

FIG. 2 is a schematic cross section of FIG. 1 taken along the line A–A.

DESCRIPTION OF THE PREFERRED METHOD AND APPARATUS FOR CARRYING OUT THE METHOD

According to the method of the present invention, the asbestos ore waste material is transported from the outlet end of a bunker **1** by means of a belt **2**, on which the transported material is preferably weighted, into the inlet gate **3** of a rapid dryer **4**. The dryer **4** used for drying the material comprises a stationary housing **7**, which preferably has a cross section as shown in FIG. **2**, and at the bottom region of which a shaft **9** extending parallel to the elongation of the housing is journaled to which a plurality of radially extending impact members or paddles **8** are fixed for rotation with the shaft **9**. A stream of hot gas at a temperature of about 500°—900° C. is passed from the left end, as viewed in FIG. **1**, to the right end of the dryer **4** and the hot gas may comprise a mixture of waste gas from a furnace **5** mixed with fresh air and guided through the duct **6** into the dryer to leave the latter to the tubular outlet **11** at the upper region of the right dryer end. When during feeding of asbestos ore waste through the inlet gate **3** the shaft **9** and the impact members **8** fixed thereto are rotated at high speed, by drive means not shown in the drawing, the ore waste will be whirled around in the interior of the dryer housing so that the material will be rapidly dried and subjected to repeated impacts by the members **8** while the material is transported by the gas stream from the left to the right end, as viewed in FIG. **1**. At the right end of the dryer the dried heavy material is discharged through the discharge gate **10** onto a conveyor belt **15**. The more or less cooled hot gas laden with moisture and the fines contained in the ore waste are sucked through the outlet end **11** in the upper region of the right end of the dryer by means of an exhaust fan **12** through a cyclone separator **13** and into a filter **14** in which dust particles contained in the gas are separated from the latter. The material discharged from the bottom end of the cyclone separator **13** and the dust discharged from the bottom end of the filter **14** are transported together with the material discharged through the gate **10** from the dryer by the conveyor belt **15** into an impact breaker **16**. The impact breaker **16**, of known construction, comprises a fast rotating impeller **18** provided with a plurality of substantially radially extending blow bars **17** which impel the material received by the impact breaker onto a plurality of tiltably mounted and yieldable impact plates **19** so that the material fed into the impact breaker is further com-

minuted and especially the small asbestos fibers or copses are separated in individual fibers. The material discharged through the outlet end **20** of the impact breaker **16** is separated in a known manner by screening and pneumatic sifting into asbestos fibers and sandlike gangue.

The whirling of the asbestos ore material during drying thereof in the hot gas stream may also be accomplished by other means than described above, but it is essential according to the method of the present invention that the material during the drying in a hot gas stream is subjected to forceful agitation and this agitation of the material is preferably performed by mechanical means which whirl the particles to be dried around in the gas stream to thereby subject the material while in the dryer to repeated impacts to separate at least some of the asbestos fibers from the remainder of the material and to prevent encrustation of the material during the drying process, to thereby enhance substantially complete separation of the asbestos fibers from the gangue and separation of the asbestos fibers from each other during the subsequent treatment of the material in the impact breaker.

The process according to the present invention was carried out in a pilot plant as schematically illustrated in FIG. **1** in which an average of 100 tons per hour of wet ore containing a moisture content of approximately 7 percent was dried in a dryer as described to an average moisture content of 1.5 percent and the thus dried material then subjected to further treatment in the impact breaker. Comparative tests made with a dryer using a rotating drum of known construction showed a considerable increase of recovered fibers by drying the waste ore in a dryer as above described.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which fairly constitute characteristics of the generic and specific aspects of our contribution to the art.

What I claim as new and desire to be protected by Letters Patent is set forth in the appended claims.

1. A process for dressing asbestos ore waste comprising the steps of drying the asbestos ore waste in a stream of hot gas while subjecting the waste to forceful agitation so as to whirl the waste material through the gas stream to thereby separate some of the fibers from the ore waste; and subsequently comminuting the material in an impact breaker to separate substantially all remaining asbestos fibers from the asbestos ore waste.

2. A process as defined in claim **1**, wherein the asbestos ore waste is dried to a moisture content of 1—2 percent.

3. A process as defined in claim **2**, wherein said hot gas has a minimum temperature of 300° C.

4. A process as defined in claim **3**, wherein said forceful agitation of the asbestos ore waste during the drying is carried out by mechanical means.

5. A process as defined in claim **3**, wherein said step of drying the asbestos waste comprises the steps of feeding the ore waste in one end of an elongated substantially horizontally arranged container, passing a stream of said hot gas from one to the other end of said container, and subjecting the ore waste to the action of fast rotating impact members arranged in the bottom region of the container so that the ore waste is repeatedly upwardly thrown in the container and transported by the gas stream from the one to the other end of the container.

6. A process as defined in claim **5** and including the steps of discharging the heavy particles of the ore waste from the bottom region of the other end of the container and sucking a mixture of moisture laden gas, light particles of the waste, separated fibers and dust out from the upper region of the other end of the container, separating at least the gas and dust from the mixture and subjecting the remainder of said mixture and the heavy particles discharged from the bottom region at the other end of the container to the comminuting action in the impact breaker.

7. A process as defined in claim **1**, wherein said asbestos ore waste is dried to a maximum moisture content of 1 percent.

8. A process as defined in claim **7**, wherein said hot gas has a temperature of between 300° and 900° C.

9. A process as defined in claim **8**, wherein said hot gas comprises the flue gases of a furnace.

10. A process as defined in claim **3**, wherein the material is comminuted in said impact breaker until the asbestos fibers are also completely separated from each other.