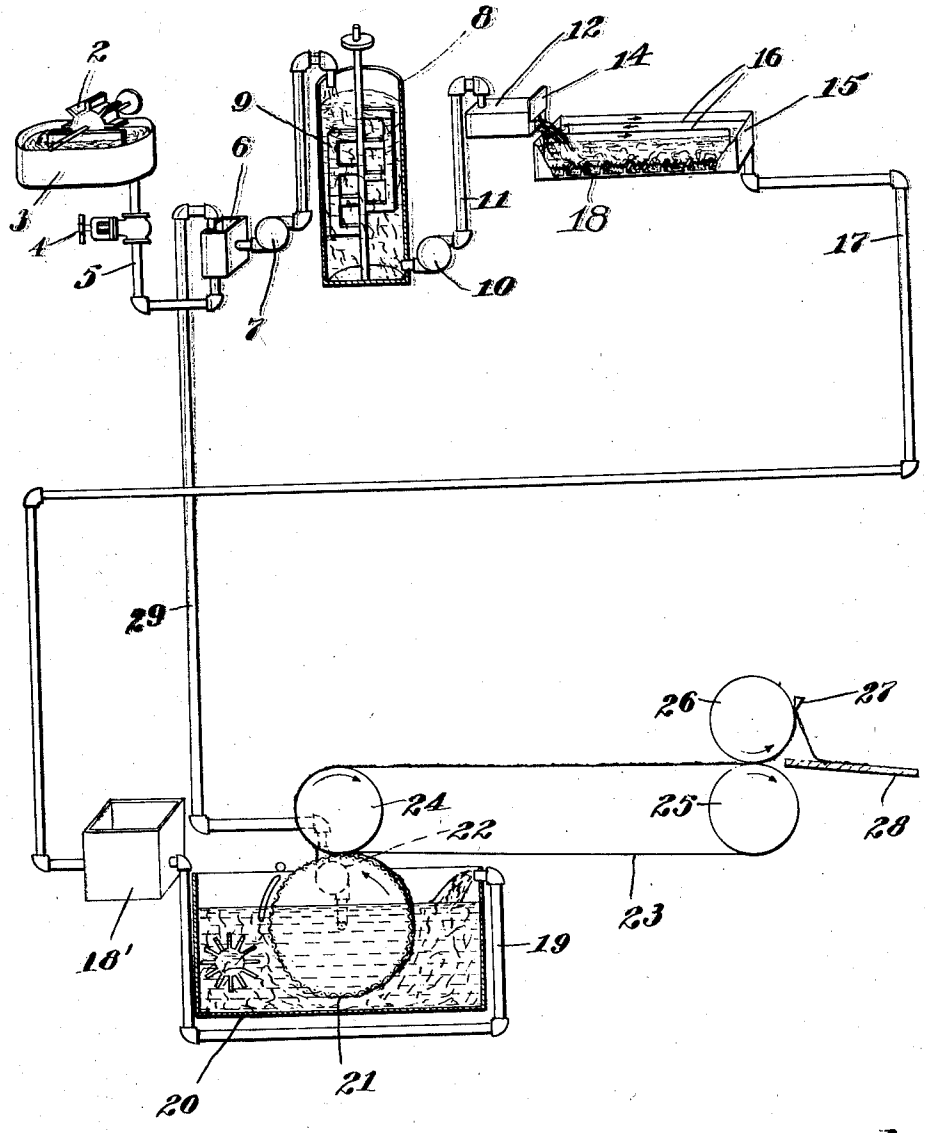
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E. F. NANFELDT

PROCESS OF CLEANING ASBESTOS

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Inventor
Ernest F. Nanfeldt.
by J. R. McCready.
his attorney

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UNITED STATES PATENT OFFICE.

ERNEST F. NANFELDT, OF NEW HAVEN, CONNECTICUT.

PROCESS OF CLEANING ASBESTOS.

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This invention relates to processes of washing or cleaning asbestos to prepare it for subsequent uses or operations, especially those of carding and spinning to produce asbestos yarn. Yarns of this character require the long fibre asbestos and the process of manufacture usually practiced heretofore has consisted in crushing the asbestos rock as it comes from the mines and then screening the crushed mass in order to eliminate the rocks, grit, sand, and similar foreign materials, and also for the purpose of grading the fibre to a certain extent. In making the yarn the longer fibre screened in this manner is next mixed with a small percentage of cotton and the mixture is taken to a carding machine which works the asbestos and cotton into the form of a roving. This roving then is spun and twisted to produce a yarn from which asbestos fabrics of various kinds are woven.

This process is open to the objection that a large part of the fibre goes through the screen with the sand, rocks, and other foreign material which it is desired to eliminate and a very substantial part of the usable fibre thus is lost. Furthermore, the screening operation does not remove all of the sand and rocks but leaves a considerable percentage of this material mixed with the screened fibre which later causes much trouble, particularly in the carding machine. A further objection to this process is that the crushing and screening operations produce an excessive quantity of dust and the conditions under which the men must work are thus very unsanitary.

It is the chief object of the present invention to improve the methods of separating the usable asbestos fibre from the sand, rocks, and other foreign material which it is desired to eliminate with a view especially to recovering a larger percentage of the asbestos fibre, effecting a cleaner separation of the fibre from the undesirable materials, and also for the purpose of eliminating the unsanitary feature, above mentioned, which attends the practice of the prior processes.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, the single figure of which illustrates diagrammatically an apparatus for carrying out the present process.

Referring now to the drawings, 2 designates a beater of the character ordinarily used in the manufacture of pulp and paper, and 3 designates a tank of suitable form to cooperate with this beater. A quantity of asbestos rock as it comes from the mines is dumped into the tank 3 and is there mixed with a relatively large quantity of water. The motion of the beater, together with the action of the water on the asbestos rock, breaks up the rock and frees the fibre from the heavy waste materials, such as the sand, rocks and grit originally present in the asbestos rock. After a mixture of this character has been sufficiently worked to free the fibre, the valve 4 is opened and the mixture or "stock" flows through the pipe 5 into a regulating box 6 for the pump 7 which delivers the mixture to a stuff chest 8. An agitator 9 working in this tank or chest keeps the materials therein constantly moving and thus prevents all except the very heaviest of the materials carried by the water from depositing.

Another pump 10 forces the mixture out of the bottom of the chest 8 through a pipe 11 into a regulating box 12 having an adjustable delivery gate 14 at one end. The stock flows from the regulating box 12 into a trough 15 which may be provided with partitions 16 that form a zigzag path for the flow of the stock therethrough to the outlet pipe 17. A series of baffle plates 18 are secured transversely in the bottom of the trough 15 so that as the mixture flows therethrough the sand and other heavy waste materials carried by the current will be caught by the baffles while the fibre will be carried on by the current of water. This trough may be made of such a length, and the velocity of the current so regulated, that practically all of the waste materials still carried by the water will be separated from the fibre while the mixture flows through this trough. It is obvious that the trough may have simply a single channel therethrough for the flow of stock, if desired, and that it can be tipped at an angle, if found desirable, in order to better obtain the desired current velocity.

The pipe 17 delivers the mixture of fibre and water from which the foreign materials have been removed, as above explained, to another regulating box 18′ and from there it is conducted by a pipe 19 to a tank 20 in which is mounted the rotating screen 21 of a paper making machine of the cylinder type.

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A pump 22 creates a suction in the interior of this rotating screen thus causing a rapid flow of the water in the tank 20 through the screen. The asbestos fibre carried by the water is caught on the screen and the film of fibre so deposited is removed from the rotating screen by the felt 23 supported on the rolls 24 and 25. This film or sheet of fibre, in turn, is removed from the felt by the cylinder 26.

In this type of machine it is the usual practice to allow the coating of paper to build up on the cylinder 26 to the thickness required and then to remove it therefrom in the form of relatively thick sheets, and this practice is followed according to the present invention when it is desired to build asbestos board or asbestos paper. When, however, the asbestos cleaned in this manner is to be used for some other purpose such, for instance, as yarn, a scraper 27 is arranged to bear against the peripheral surface of the cylinder 26 where it scrapes the asbestos off the cylinder as fast as it is delivered thereto by the felt 23, this asbestos dropping on an apron 28 or into a convenient receptacle. If the asbestos so cleaned and collected is to be spun it is next dried and run through a picking machine or treated in any other convenient manner to render it fluffy and suitable for the use to which it is to be put.

A very small percentage of the fibre, particularly that of very short length, may go through the screen 21 of the paper making machine, and in order to save this fibre a pipe 29 connected to the outlet side of the pump 22 delivers the water that has passed through the screen 21, and any material carried thereby, to the regulating box 6. In other words, this water is re-circulated so that any waste of usable fibre is substantially eliminated.

It will now be appreciated that this process effectually cleans the asbestos. It has actually been proven in practice that it effects a substantially complete elimination of the undesirable materials originally associated with the asbestos fibre. The sand, rocks and other waste materials are partially eliminated in the beater tank 3 and they are also deposited to some extent in the stuff chest 8, but the greater part of these waste materials are eliminated and the cleaning of the asbestos substantially completed while the stock flows through the trough 15. It has also been demonstrated that this process effects an enormous saving in usable fibre. Moreover this process can be readily carried out under conditions that are entirely sanitary for the workmen and it can be practiced at a greatly reduced labor expense when compared with that involved in prior processes. When the asbestos is to be used in making yarn a very appreciable saving in expense for card clothing is effected by using this process. That is, the prior processes, as above explained, do not eliminate all the rocks and sand and these waste materials wear out the card clothing very rapidly. A further advantage produced by this process is that it leaves the asbestos fibre in a highly fluffy condition, in which the individual fibres of asbestos appear to be independent of each other to a degree that cannot be produced in the asbestos cleaning processes heretofore practiced.

While I have herein disclosed the process of this invention in connection with a form of apparatus which I prefer to use in practicing it, it will be readily appreciated that the invention is entirely independent of any specific form of apparatus.

What is claimed as new is:

1. The method of separating asbestos fibre from rock and associated impurities which comprises submerging the mineral in water, passing the mineral continuously and repeatedly through rubbing and crushing means by a circulation of the water of submergence in a closed cycle to break up the friable elements and separate the integral fibres, withdrawing the mineral fibers from said cycle at will from time to time and applying a gentle agitation thereto, to further separate the mineral from the fibre, then completely separating the lighter constituents by flotation and the heavier constituents by sedimentation.

2. The method of separating asbestos fibres from rock and associated impurities which comprises submerging the mineral in water, repeatedly passing the mineral through rubbing and crushing means by a continuous circulation of the water of submergence, withdrawing the mineral and fibre from said circulation at will and applying gentle agitation thereto, flowing the mixture over a series of baffles in a circuitous path at a velocity causing the heavy waste material associated with the asbestos to be caught by the baffles while the asbestos fibre is carried on and then separating the fibre from the greater part of the water in which it is carried.

3. The method of separating asbestos fibre from rock and associated impurities which comprises submerging the mineral in water, repeatedly passing the mineral through rubbing and crushing means by a continuous circulation of the water of submergence, withdrawing the mineral and fibre from said circulation at will and applying a gentle agitation thereto, flowing the mixture over a series of baffles in a circuitous path at a velocity causing the heavy waste material associated with the asbestos to be caught by the baffles while the asbestos fibre is carried on, separating the fibre from the greater part of the water in which it is carried, and

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re-circulating such water together with floating values still retained therein through the foregoing steps.

4. The method of separating asbestos fibre from rock and associated impurities which comprises submerging the mineral in water, passing the mineral successively through rubbing and crushing means by a circulation of the water of submergence, withdrawing the mixture and applying a gentle agitation thereto, regulably flowing said mixture over a series of baffles in a circuitous path at a velocity causing the heavy waste material associated with the asbestos to be caught by the baffles while the asbestos fiber is carried on by the current, screening the fiber out of the water in which it is carried and re-circulating the water with any floating values entrained therein.

In testimony whereof I have signed my name to this specification.

ERNEST F. NANFELDT.