PATENT SPECIFICATION

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Specification Accepted: March 24, 1938.

COMPLETE SPECIFICATION

Defibrator or Opener for the Preparation of Asbestos Fibres and the like

I, ALESSANDRO MAGNANI, of Italian nationality, of Broni, Italy, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

In the preparation and treatment of asbestos fibres many difficulties are met with owing to the fact that, in the preparation of asbestos both for the manufacture of fibrous cements and for the textile industries, it is necessary to obtain filaments each consisting as far as possible of a single elementary fibre without altering the original length of the same. For these operations it is usual to employ defibrators or openers consisting of a drum within which rotates a bladed wheel, shaking and beating the asbestos mass introduced into the drum and issuing through apertures in the cylindrical surface of the drum. For the purpose of varying the degree of fineness of the asbestos treated, the size of the outlet apertures is varied by any means, which causes the material to remain for a sufficient period of time inside the defibrator.

These known systems present many inconveniences.

Firstly, in order to obtain a sufficiently high output, excessive speeds are necessary which causes the fibres to break. The location of the outlet apertures in the cylindrical surface of the drum has the further drawback that it permits discharge of the asbestos before it has been softened under the very powerful centrifugal force acting on the relatively heavy pieces, and the product thus obtained is not uniform and not quite satisfactory. Finally, when the outlet apertures are reduced in size so as to prolong the period of the treatment and thereby ensure the defibration of the harder pieces, the softer pieces are acted upon so long that they are crumbled.

The present invention has for its object to eliminate these inconveniences and this object is attained according to the invention by the adoption of a defibrator or opener having a succession of adjacent treatment chambers of substantially cylindrical shape, communicating with each other through apertures in their end walls and each provided with a set of beating arms carried by a common longitudinally arranged rotatable shaft, the arrangement being such that the progressive advance of the material under treatment between successive chambers through said apertures is assisted by a current of air produced by the rotation of said beating arms.

Two embodiments of the present invention are illustrated diagrammatically by way of example in the accompanying drawings in which :—

Fig. 1 is a longitudinal section of one of the embodiments,

Figs. 2 and 3 are cross sections of the same on the lines A—A and B—B respectively of Fig. 1,

Fig. 4 illustrates the beating arms of the defibrator or opener according to Fig. 1,

Fig. 5 is a longitudinal section of another embodiment, and

Fig. 6 illustrates the method of attachment of the beating arms in the embodiment according to Fig. 5.

Referring to Fig. 1, the defibrator or opener consists of a succession of adjacent treatment chambers 1, 2, 3, 4 of substantially cylindrical shape which communicate with each other through apertures in their end walls, the outlet apertures 8, 9, 10 of chambers 1, 2, 3 being connected by means of conduits 5, 6, 7 to the inlet apertures 11, 12, 13 of chambers 2, 3, 4 respectively. A hopper 14 communicates with the inlet aperture 18 of the chamber 1 and an outlet pipe 15 with the outlet aperture 19 of the chamber 4.

The treatment chambers are simply obtained by dividing a drum transversely by means of diaphragms in which are

provided the apertures of communication.

Each chamber is provided with a set of beating arms carried by a common longitudinally arranged rotatable shaft 16. The beating arms in the example illustrated are in the form of chains 17, but they may alternatively consist of radially mounted rigid or articulated hammers.

As shown in Fig. 1, the inlet apertures 18, 11, 12, 13 are all located in the left-hand end walls of the treatment chambers close to and surrounding the shaft 16, while the outlet apertures 8, 9, 10, 19 are all located in the right-hand end walls of the treatment chambers. The outlet apertures 8, 9, 10, 19 are displaceable radially and can be varied in size with the aid of adjustable plates 20, 20' controlled by suitable operating means (not shown).

In operation, the asbestos is fed into the defibrator or opener through the hopper 14 and enters the treatment chamber 1 through the inlet aperture 18. The asbestos is then subjected to the action of the set of beating arms or chains 17 within the chamber 1. The fibres which are already sufficiently separated in this chamber are forced by the current of air induced by the rotation of the beating arms through outlet aperture 8, conduit 5 and inlet aperture 11 into treatment chamber 2. The separated fibres are acted upon in this chamber 2 and in the subsequent chambers 3 and 4 as in chamber 1 and thus pass rapidly through the apparatus until they issue through the outlet pipe 15. Those pieces of asbestos, however, which have not yet been sufficiently subdivided remain entrapped in the peripheral parts of the chambers due to the centrifugal effect and cannot advance until they have been subdivided to the required extent.

The degree of fineness obtained in each successive chamber can easily be regulated by adjusting the positions of plates 20 and 20' so as to alter the effective sizes of the outlet apertures 8, 9, 10 and 19 and their radial distances from the axis of the shaft 16. The effect of reducing the size of the outlet aperture of a treatment chamber is to cause the asbestos material to remain longer under treatment in the chamber in question so that a greater degree of fineness will be obtained throughout before the material leaves this chamber; while the effect of drawing the outlet apertures nearer to the axis of rotation of the shaft 16 will be to render more difficult the passage of those pieces which are still of considerable size and which are compelled by the centrifugal force towards the external walls of the chambers.

In the example illustrated both the sizes and positions of the outlet apertures 8, 9, 10, 19 of the four successive chambers are adjustable. In this case it will usually be desirable to make each successive outlet aperture smaller than the preceding one and nearer to the axis of the shaft 16, so that the fineness of the material passing will increase from the inlet to the discharge end of the defibrator or opener. The number of treatment chambers may however be varied according to requirements and regulating devices other than and different from those illustrated in Figs. 1 and 2 may be adopted.

The apparatus described above, which gives perfect results, is somewhat complicated. When, therefore, the output desired is not considerable, the simpler arrangement shown in Fig. 5 may be employed. In this case the treatment of the fibres, introduced through a hopper 22 and discharged through a tube 23, is performed inside a cylindrical chamber divided into several adjacent vertical compartments by means of diaphragms 24 provided with passages 25—26 the amplitude of which may be regulated by operating slide valves 27, 28 which may be fixed in position after adjustment.

An axial shaft 29, driven by a pulley 30 or otherwise, is provided with articulated beating arms which in this case consist of blades. Inside each chamber are two double blades, one 31—31' diametrically connected to the shaft 29 by rings 32—32' and the other (which is not shown in the drawing) diametrically connected to the same shaft at right angles to the blades 31—31' and somewhat backwards, by means of similar rings 33. These rings may be fixed on the shaft at any suitable inclination, for instance as shown in Fig. 6. Preferably this connection is effected by means of a pivot pin 34 which can turn on its axis and can be fixed by suitable means (not shown) in any position of adjustment.

The regulation of the apertures 25—26 and, if desired, the regulation of the inclination of the blades 31 obtained by the alteration of the inclination of the rings 32—33 relative to the shaft 29 enable the rate of advance of the material treated and consequently the output per hour of the apparatus to be varied within wide limits.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is :—

1. Defibrator or opener for the preparation of asbestos fibres and the like, characterised by a succession of adjacent treatment chambers of substantially cylindrical shape, communicating with each other through apertures in their end walls

provided the apertures of communication.

Each chamber is provided with a set of beating arms carried by a common longitudinally arranged rotatable shaft 16. The beating arms in the example illustrated are in the form of chains 17, but they may alternatively consist of radially mounted rigid or articulated hammers.

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The regulation of the apertures 25—26 and, if desired, the regulation of the inclination of the blades 31 obtained by the alteration of the inclination of the rings 32—33 relative to the shaft 29 enable the rate of advance of the material treated and consequently the output per hour of the apparatus to be varied within wide limits.

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and each provided with a set of beating arms carried by a common longitudinally arranged rotatable shaft, the arrangement being such that the progressive advance of the material under treatment between successive chambers through said apertures is assisted by a current of air produced by the rotation of said beating arms.

2. Defibrator or opener as claimed in claim 1, characterised in that each treatment chamber has an inlet aperture located near the axis of rotation of the rotatable shaft and an outlet aperture located near its periphery, the inlet aperture of each chamber after the first being connected to the outlet aperture of the preceding chamber by means of a conduit.

3. Defibrator or opener as claimed in claim 1, or 2, characterised in that the beating arms consist of chains attached to the rotatable shaft.

4. Defibrator or opener as claimed in claim 1, characterised in that the treatment chambers are simply obtained by dividing a drum transversely by means of diaphragms in which are provided the apertures of communication.

5. Defibrator or opener as claimed in claim 1 or 4, characterised in that the beating arms consist of blades fixed on the shaft by means which enable the inclination of said blades to the axis of the shaft to be varied as desired.

6. Defibrator or opener as claimed in claim 5, characterised in that the connection of the blades with the shaft is effected by means of pivot pins fitted in holes drilled in the shaft, said pins being capable of rotating on their axes and means of any suitable kind being provided for fixing said pivot pins in any position selected.

Dated this 11th day of February, 1937.

REDDIE & GROSE,
Agents for the Applicant,
6, Bream's Buildings, London,
E.C.4.

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