May 13, 1947. L. C. PHARO 2,420,495

ASBESTOS DUSTING PROCESS AND APPARATUS

Filed March 26, 1943 2 Sheets-Sheet 1

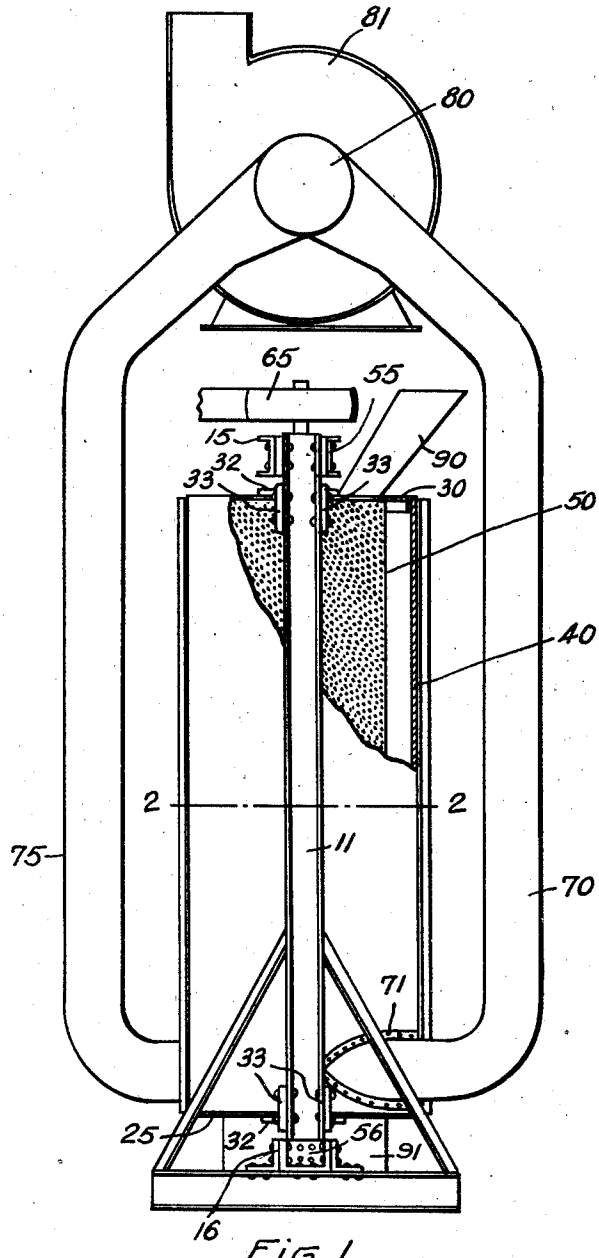


FIG. 1.

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ASBESTOS DUSTING PROCESS AND APPARATUS

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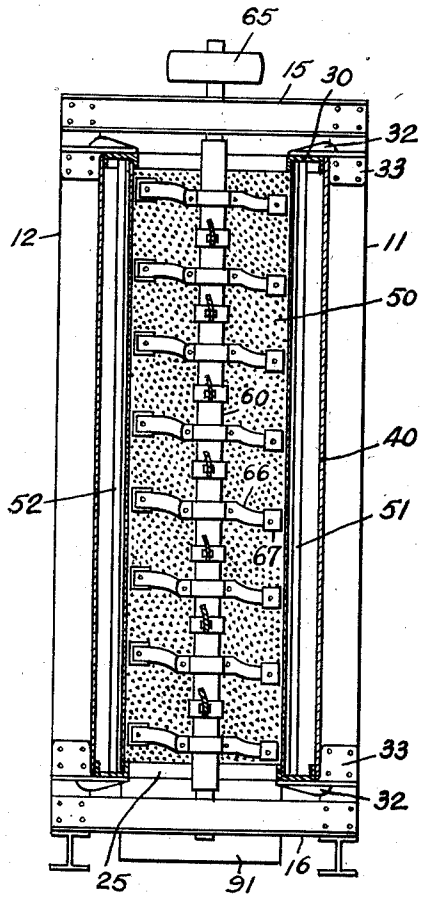


FIG. 3.

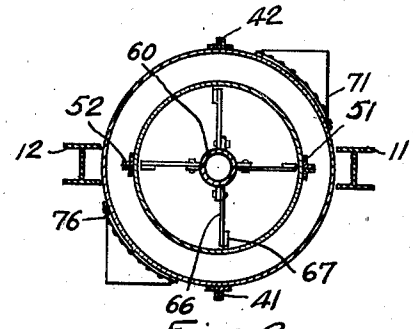


FIG. 2.

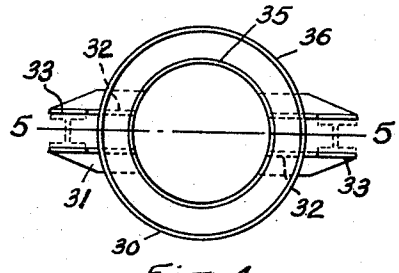


FIG. 4.

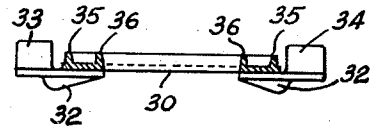


FIG. 5.

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ASBESTOS DUSTING PROCESS AND APPARATUS

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Application March 26, 1943, Serial No. 480,699

2 Claims. (Cl. 209—2)

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Introduction

This invention relates to the treatment of fibrous materials, particularly to material of the nature of asbestos, to remove therefrom finely divided foreign substances such as dust.

In the milling of asbestos in the dry state there is a tendency for considerable dust to become entrained in the fibers. The removal of this foreign material is an extremely difficult problem owing to the relatively delicate nature of the fiber and the fact that mechanical handling tends to injure it and thus reduce its quality for textile and other uses.

Objects

Having regard to the foregoing, it is a principal object of the present invention to provide a method and means of removing finely divided foreign substances from fibrous materials in which they are entrained. It is a further object of the invention to provide a method and means for performing such operations in which the injury to the fibrous material is reduced substantially to a minimum. It is a still further object to provide an apparatus for performing these functions which is convenient to construct and to operate.

With these and other objects in view, a characteristic embodiment of the invention is inherent in the following procedure. The fiber containing the finely divided foreign matter is entrained in a stream of air and passed through a treating zone while subjected to constant agitation so that the foreign matter is loosened. The fiber is then removed from the stream, a major portion of the foreign matter remaining in the stream and being carried away by it. In a convenient more specific embodiment, the fiber is passed through an elongated fiber chamber, preferably vertical. The walls of the fiber chamber are provided with openings adapted to allow the escape of finely divided foreign substances, but not of the fibrous material. The openings are connected to a source of suitable exhaust pressure, conveniently a jacket or casing forming a dust chamber about the fiber chamber the walls of the fiber chamber thus constituting a screening member. More specifically, the agitation may be accomplished by an elongated shaft extending centrally through the fiber chamber and agitating arms extending outwards from the shaft. Treatment according to this procedure, under conditions suitable to the specific nature of the material being handled results in the removal of a major portion of dust and other foreign substances without substantial injury to the material itself.

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Detailed description

The invention will be understood more specifically by reference to the following detailed description illustrated by the accompanying drawings showing preferred equipment used in carrying out a specific embodiment of the invention, and in which:

Figure 1 is an elevation partly in section of this preferred form of apparatus.

Figure 2 is an elevation taken looking in a direction at right angles to Fig. 1, of the apparatus with the outer casing removed, and the screen sectioned.

Figure 3 is a cross section along the line 3—3 of Figure 1.

Figure 4 is a plan view of a preferred form of casing and screen support.

Figure 5 is an elevation partly in section of the support shown in Figure 4.

The apparatus includes a frame, constituted by vertical beams 11 and 12, and top and bottom cross beams 15 and 16 respectively. This frame is preferably of structural steel. Connected to the frame is a bottom annular support, in this case a casting 25. This casting is bolted to the frame by a bracket 32 forming a part thereof. A similar casting 30 is bolted to the top of the frame by brackets 31. Extending between the castings 25 and 30 and supported thereby is a fixed cylindrical metal shell or casing 40. This casing is made up of two halves held together by companion angles 41 and 42. Within the casing and also extending between the castings 25 and 30 and supported thereby is a perforated steel plate or fixed screen column 50 also formed in two halves and held together by companion angles 51 and 52. This screen confines the asbestos in its gravitational movement. The castings 25 and 30 as best illustrated in Figures 4 and 5 include a circular body portion provided with upstanding outer and inner flanges 35 and 36 respectively. Oppositely disposed connecting portions 31 and 32 are provided on the circular body 180° apart. Each connecting portion includes a somewhat Y-shaped member having connecting blades 33 and a stem including a downwardly extending strengthening fin 32.

The cross beams 15 and 16 are provided with thrust ball bearings 55 and 56 respectively in which are journalled the turned down ends of a shaft 60. The shaft 60 extends throughout the height of the apparatus. On the upper end of

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the shaft 60 is a drive pulley 65 connected to a suitable driving source (not shown). To the shaft are bolted, intermediate its ends, by clamps forming a part thereof, a series of agitating arms, preferably drop steel forgings 66 provided with hardened, preferably manganese, tips 67 extending to points closely adjacent the screen 50. The arms may be given a pitch to assist the flow of the material.

The outer shell or casing 40 is provided adjacent its lower end and at opposite sides thereof with respective openings forming exits to the casing, from which extend exhaust passages or pipes 70 and 75. These pipes are bolted to the casing as at 71 and 76 respectively and extend tangentially therefrom. The pipes extend to a suction fan 80 having an exhaust connection leading to a suitable source of vacuum pressure, in this case a fan 81.

The screen encloses what may be termed a fiber chamber through which the fiber is adapted to pass during its treatment. The space between the screen 50 and the outer shell or casing 40 constitutes a dust chamber into which dust is drawn from the fibrous material. These chambers are preferably elongated and vertical. The vertical disposal of the chamber allows the unsupported material to fall by gravity and to be kept in divided state by agitation with a minimum of mechanical action upon it while the dust is drawn off. The chambers can of course be sloping or horizontal. A chute 90 leads into the top of the fiber chamber for the introduction thereto of the material to be treated. A chute 91 leads from the bottom of the fiber chamber for the discharge of the fiber.

Operation

In operation the shaft 60 is rotated at a speed depending upon the nature of the material and the amount of agitation desired. Exhaust pressure is applied to the pipe 70. The material is fed through the chute 90 into the entrance of the fiber chamber enclosed by the screen 50. The material, usually substantially dry fibrous material containing finely divided foreign matter such as dust, gravitates freely and rapidly from the top of the machine towards the bottom and in so doing it is subjected to a transverse fluffing and agitating action by the arms 66. This serves to separate the lose material and to separate from this material foreign particles such as dust, etc. The foreign particles are drawn through the screen 50 by the suction set up by the pipes 70 and 75 and the volume of air passing through the fiber chamber and through the perforated screen into the dust chamber. The material quickly gravitationally passes from top to bottom of the fiber chamber to the discharge chute 91. A feature of the apparatus is the downward path through which the asbestos travels, principally by gravitation, as opposed to a horizontal path where some other impelling force is necessary. A further feature is that the arms 66 and tips 67 extend to points close to the screen 50 so as to reach all the asbestos gravitating through the cleaning passage. Since the screen column is open at the top and bottom, asbestos may be continuously fed and removed from the fixed screen column and air is introduced to the column by means of the suction so that the suction effect is present to substantially the central portion of the column.

The net effect of treating asbestos in this way is to remove a large proportion of the loose dust and also to fluff or liberate the fibers slightly without substantial injury thereto as might be occasioned by other methods of treatment. In the present procedure injury to the fiber is reduced to a minimum. This treatment must be contrasted with the beating action of a grader whose function is to open up the spicules of fibers. The grader is a machine with an elongated shaft provided with beater arms which have a pitch operating to drive the material through a horizontal beating chamber. The material takes about 10 times as long to pass through such an apparatus as it does to pass through the present device and the chopping action usually has an injurious effect on the fibers.

In the present apparatus the material, in the case of fiberized asbestos, is preferably in the dusting chamber usually in the neighborhood of about five seconds. According to such preferred conditions, the shaft 60 is rotated at about 300 to about 720 revolutions per minute. The pipes are about 10 inches in diameter and the suction applied is about 2 inches of vacuum. In an apparatus having a cylindrical fiber chamber 26 inches in diameter, asbestos has been treated at the rate of about 2 tons per hour with the amount of finely divided foreign material (being mostly dust) removed therefrom being in the neighborhood of about 10% by weight. These quantitative factors are as applied to Chrysotile Asbestos spinning fiber in a substantially dry state after it has passed through the milling operations to remove rock and free sand and a fiberizing operation such as for instance, that resulting from the use of an apparatus as described in U. S. Patent No. 2,219,077. Comparable results will be achieved with other types of asbestos or other fibrous materials.

Advantages

A principal advantage of the invention is in providing an effective but simple treatment whereby a large proportion of the dust may be removed from fibrous materials without injury to these materials. An effective means is thus provided for improving the quality of fibrous materials, particularly the spinning quality of asbestos fibers.

It will be understood that, without departing from the spirit of the invention or the scope of the claims, various modifications may be made in the specific expedients described. The latter are illustrative only and not offered in a restricting sense.

The sub-titles used throughout the specification are merely to simplify reference thereto and should otherwise be disregarded.

I claim:

1. An apparatus suitable for treating asbestos containing finely divided foreign substances, comprising, a base, a support member having a substantially cylindrical body portion, said support member including outwardly extending bracket portions mounted on said base, said support member having a pair of upstanding concentrically-arranged annular flanges, a vertical cylindrical screening member resting on said base member and having its lower edge engaging one of said flanges and extending upwards therefrom to constitute a vertical passage for the fibrous material, a cylindrical casing of larger diameter than the screen member also resting on said base member and having its lower edge connected to the other flange and extending upwards from the support member, the screening member and casing form-

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ing therebetween an exhausting chamber, vertical beams extending upwards from said base substantially co-extensive with said casing, a head member substantially identical with said support member mounted on said vertical beams and having concentric annular flanges engaging the upper edges of said casing and screening member respectively, a horizontal beam mounted adjacent said base, a horizontal beam mounted adjacent said head member, each horizontal beam having a bearing, a vertical shaft journalled in said bearings, one end of said shaft extending above said frame, a drive connection on the extending end of said shaft, a plurality of agitating arms mounted on said shaft intermediate its ends, said arms extending outwardly to points adjacent the wall of the screening member whereby on rotation of said shafts the ends of said arms move closely adjacent the latter, said arms being adapted to disperse the material travelling through the passage thereby to dislodge finely divided material, means for applying suction to the exhausting chamber.

2. A continuous process of freeing substantially dry fiberized asbestos masses from finely divided foreign matter which comprises continuously feeding the asbestos masses gravitationally through a vertical fixed screen column, confining the gravitationally moving asbestos to said column while transversely fluffing and agitating the same within the column to separate and aerate the asbestos, subjecting the outer surface of said column of the gravitationally moving agitated asbestos to suction to remove the dust therefrom,

and moving agitating elements at a speed in the range of 300 to 720 revolutions per minute whereby the fiber groups are separated without substantial breaking of the fibers and the fibers are fluffed without substantial injury thereto, the cross-sectional area of the column and the intensity of the suction being such that the suction will be effective to substantially the central portion of the column to remove dust from the separated and fluffed fibers in said column through the screen without substantially interfering with the gravitational flow of the fiber, and continuously removing the clean fibers from the lower end of the column.

LEE C. PHARO.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,413,120	Hood	Apr. 18, 1922
2,280,902	Ellison	Apr. 28, 1942
2,280,903	Ellison	Apr. 28, 1942
1,784,219	Brennan	Dec. 9, 1930
1,389,277	Smith	Aug. 30, 1921
Re. 11,631	Landis	Oct. 5, 1897
1,632,620	Nanfeldt	June 14, 1927
2,344,611	Harris	Mar. 21, 1944
553,091	Woodward	Jan. 14, 1896
1,750,725	Miller	Mar. 18, 1930
1,779,993	Sturtevant	Oct. 28, 1930
2,329,910	Johnson	Oct. 5, 1897

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