May 16, 1961 J. W. ROBERTS ET AL 2,984,172

APPARATUS FOR PACKING ASBESTOS FIBERS AND THE LIKE

Filed Oct. 23, 1956 3 Sheets-Sheet 1

Fig. 1.

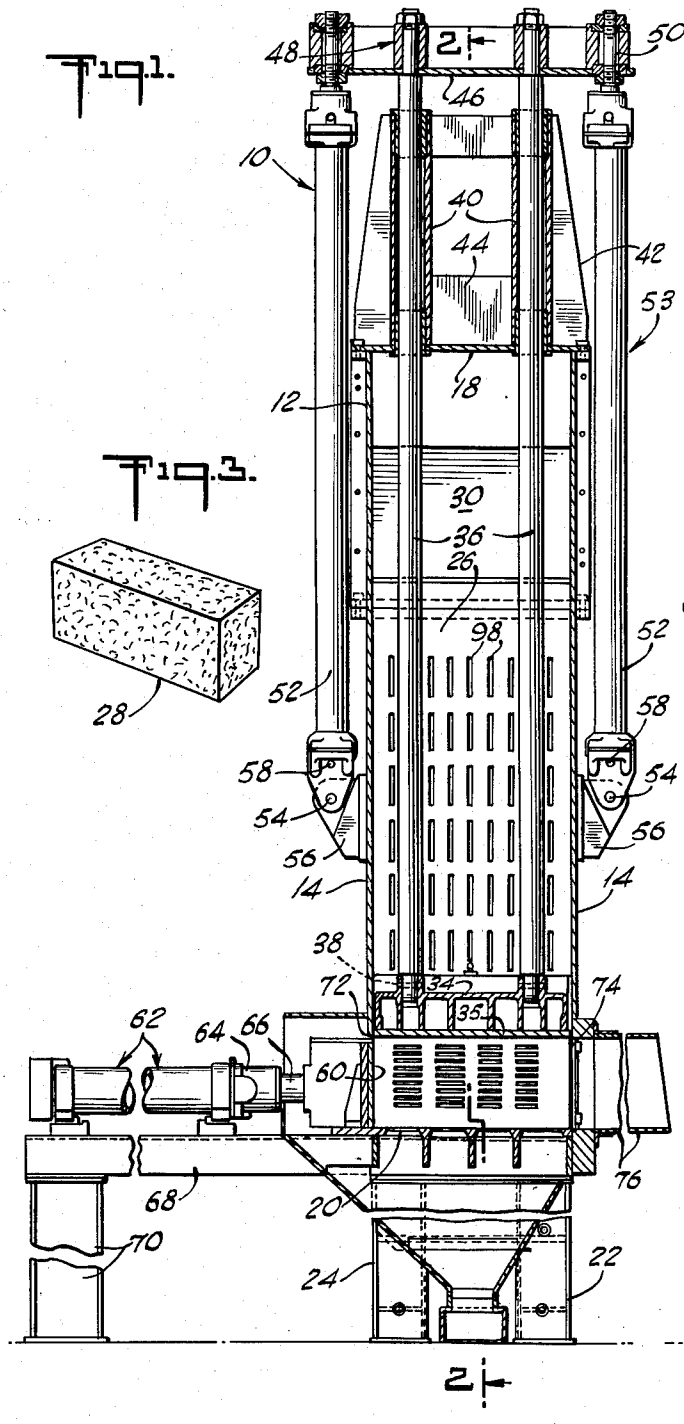
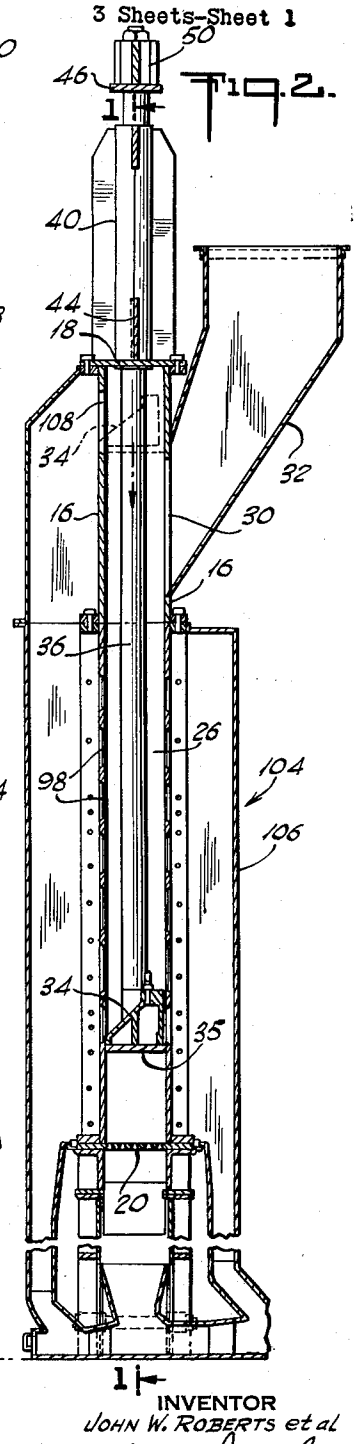


Fig. 3.

Fig. 2.



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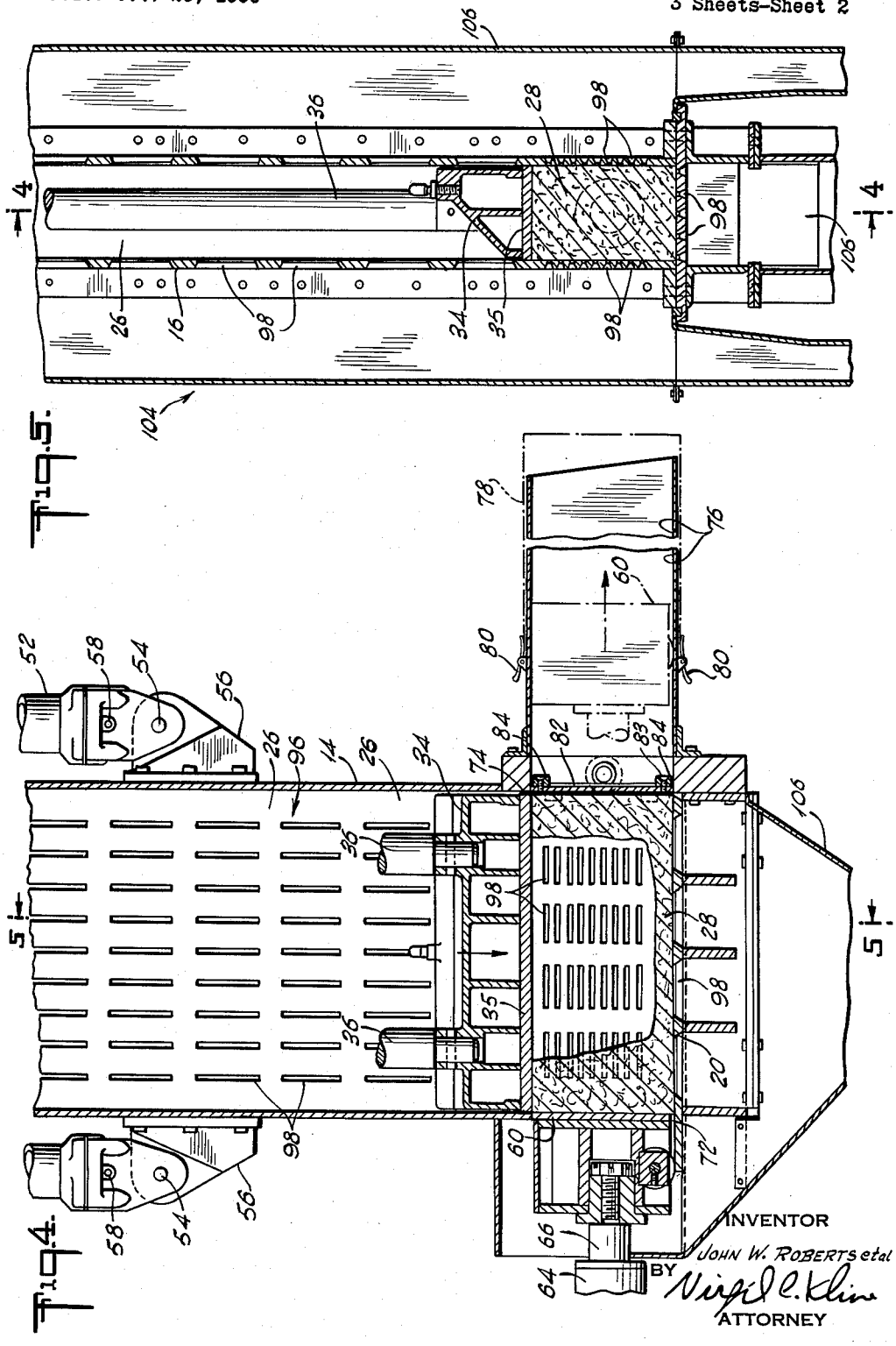


Fig. 4.

Fig. 5.

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Fig. 6.

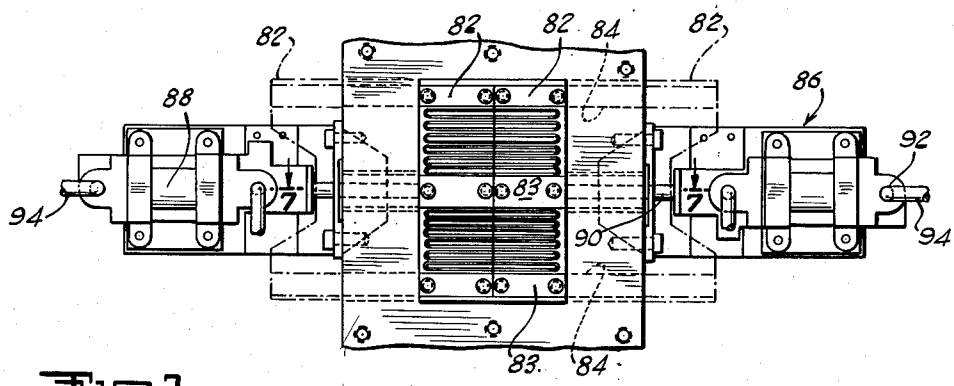


Fig. 7.

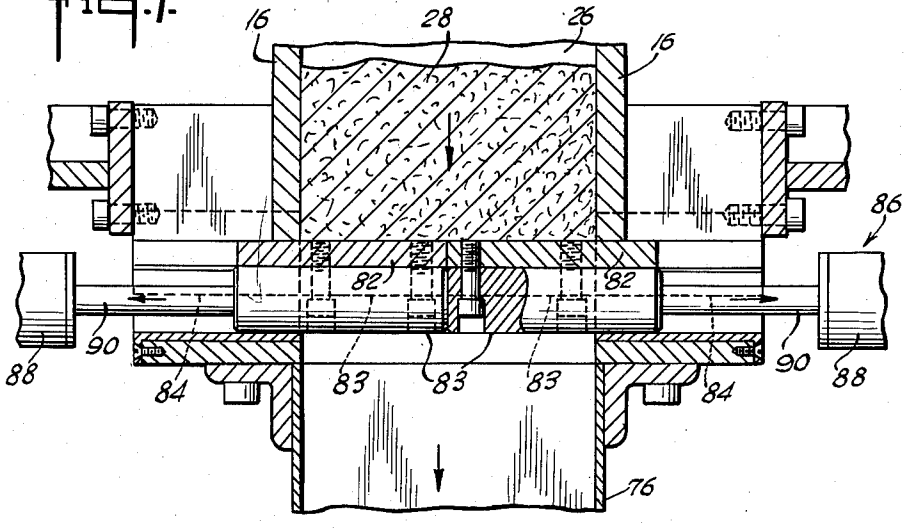


Fig. 8.

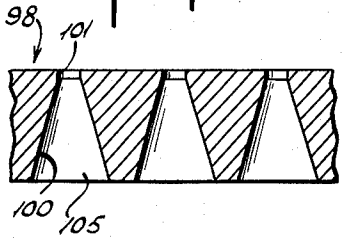
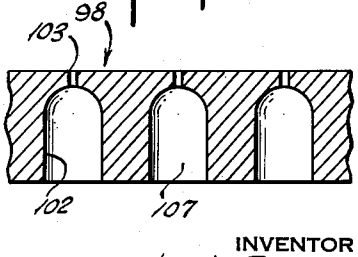


Fig. 9.



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2,984,172

APPARATUS FOR PACKING ASBESTOS FIBERS AND THE LIKE

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3 Claims. (Cl. 100—90)

This invention relates to a packing apparatus, and more particularly, to an apparatus of the type employed for packing under pressure loose fibrous material, such as asbestos and the like.

In packaging asbestos fiber heretofore, it has been customary to pack loosely the fibrous material, as by gravity, into a wrapper, such as a burlap sack or the like, for protecting the material during storage and shipment and for easily handling such fibrous material. However, by packaging the asbestos fiber in this manner, a relatively large volume of air is usually entrapped between the fibers, which prevents the fibers being packed closely together in the wrapper, and as a result, the sacks are not only sagging, for not being fully packed with the fibrous material, but the same amount of the material requires more containers than if the fibers were firmly packed therein. Furthermore, the handling and, particularly, the stacking of sagging wrappers containing the fibrous material becomes extremely difficult.

It is therefore the main purpose of the present invention to provide a new and improved system of packaging fibrous material, such as asbestos fiber and the like, whereby the handling and storing of such fibrous material is greatly facilitated, and the cost of packaging and shipping of the fibrous material is considerably reduced.

It is further the purpose of the present invention to provide an automatic pressure packing system in which the fibrous material to be packaged is first compressed into a relatively firm block and then transferred into a wrapper, which wrapper retains the firmness of the packed material and is very easily handled.

According to the present invention, a pressure packing apparatus consists of a pair of hydraulically operated plungers arranged to reciprocably operate vertically and horizontally, respectively, in an enclosed chamber, wherein a load of fibrous material is laterally compressed and longitudinally ejected from the chamber into a wrapper. The chamber is also provided with air bleeding means for bleeding the air entrapped between the fibers during compression of the material thereby forming a firm block of such material.

These and other features of the present invention are described in detail below in connection with the accompanying drawings wherein like numerals designate like parts, and in which:

Fig. 1 is a side elevation, partly in section, of a pressure packing apparatus embodying the present invention, the section being taken substantially along the line 1—1 in Fig. 2;

Fig. 2 is a vertical section taken substantially along the line 2—2 in Fig. 1;

Fig. 3 is a perspective view of a compressed fiber block produced by the apparatus of Fig. 1;

Fig. 4 is an enlarged fragmentary vertical section of the compression chamber taken substantially along the line 4—4 in Fig. 5;

Fig. 5 is an enlarged fragmentary vertical section of the compression chamber taken substantially along the line 5—5 in Fig. 4;

Fig. 6 is a fragmentary front elevation of the apparatus of Fig. 1 showing a gate arrangement for the compression chamber;

Fig. 7 is an enlarged fragmentary horizontal section taken substantially along the line 7—7 in Fig. 6;

Fig. 8 is an enlarged fragmentary view, in section, showing one type of slot construction useful in the apparatus of the instant invention; and

Fig. 9 is a view similar to that of Fig. 8 showing a modified construction slot.

Referring now in detail to the drawings, the illustrated embodiment of the pressure packing apparatus of the present invention is indicated generally by the reference numeral 10, and, as shown, comprises a box-like, hollow casing 12 of substantially rectangular shape completely enclosed by side walls 14 and 16, a top wall 18, and a bottom wall 20. The casing 12 may be supported in an upright position on suitable pedestals 22 and 24 as shown in Figs. 1 and 2. While the cross-section of the casing 12 is shown as being rectangular, it may, however, be of any other desired shape depending on the desired final shape of the compressed fibrous materials. Also, the casing 12 may be disposed horizontally as well as vertically, but the vertical disposition is preferred, since the feeding may be done by gravity thereby simplifying the operation.

The interior of the casing 12 is arranged to serve as a compressing chamber 26 for the compression of loose fibrous materials therein, such as asbestos fibers and the like, into a relatively firm block 28, as shown in Fig. 3. The fibrous material to be compressed may vary in form from a coarse to a fine fiber, or it may be even of powder-like form. An opening 30 in the side wall 14 adjacent to the top of the casing 12, may serve as an entrance for the material to be compressed. A downwardly inclined chute 32 may be provided for feeding the fiber through the opening 30 from a hopper, not shown.

Compression of fibrous material may be obtained by a ram or plunger 34 consisting of a plate 35 of a substantially rectangular shape disposed in the chamber 26 and arranged to reciprocate vertically therein. A pair of reciprocating rods 36 extending longitudinally in the chamber 26 are secured at their lower ends, respectively, to the plate 35 of the plunger 34 by pins 38. The rods 36 are further supported for slidable movement by a pair of sleeves 40 extending vertically above the top wall 18 and rigidly supported thereon by end plates 42 and cross plates 44. The rods 36 are secured at the upper ends thereof, respectively, to a horizontally extending bar 46, as by a bolt and nut arrangement, as indicated at 48, for vertical movement therewith. The bar 46 is further connected at its ends, as at 50, to a pair of piston rods arranged to reciprocate in cylinders 52 of a pair of fluid motors 53. The cylinders 52 extending vertically along the outside of the side walls 14 and disposed substantially in parallel relation thereto, are pivotally mounted at the lower ends thereof, as at 54 on lugs 56 extending laterally from the outer faces of the opposed side walls 14. The fluid motors are further arranged for actuation so as to reciprocate the plunger 34

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by the cylinders **52** being connected through ports, as indicated at **58** to a conventional hydraulic pressure system, not shown. Also, an electrically controlled system (not shown) may be provided for automatically controlling the operation of the plunger **34**.

The pressure packing apparatus **10** is further provided with a reciprocating plunger **60** disposed horizontally and operated by a fluid motor **62** consisting of a cylinder **64** and a piston rod **66** connected to a piston in a cylinder **64** at one end thereof and at the other end connected to the plunger **60**. The cylinder **64** is horizontally disposed and supported on a platform **68** extending laterally from the lower end of the casing **12** and mounted at the free end thereof on the pedestal **70**. The plunger **64** disposed horizontally is arranged to reciprocably extend laterally in the chamber **26** through an opening **72** in the side wall **14** adjacent the bottom wall **20**. Directly across the opening **72**, the opposed wall **14** of the casing **12** is provided with an opening **74** arranged for passage of the compressed block **28** of the fibrous material therethrough and into a chute **76** extending laterally and outwardly from the wall **14**, as shown best in Fig. 4. The chute 76 is arranged for supporting a wrapper or bag, as indicated at **78**, slidably fitted thereon. A set of clamps **80** may be provided on the chute **76** for engaging and retaining the bag **78** in place.

As shown in Figs. 6 and 7, the casing **12** is provided with closure means including a pair of doors or gates **82** for closing the opening **74**. The gates **82** are provided with guide bars **83** arranged to be slidably supported in slots or slideways **84**. The gates **82** are further arranged to be operated by fluid motors **86** having cylinders **88** and piston rods **90**, piston rods **90** being connected to the respective gate **82** and to a piston in the respective cylinder **88**. Operation of the gates is likewise obtained by actuation of the fluid motors **86** by fluid pressure of the hydraulic system of the apparatus **10**. Fluid under pressure is supplied to the cylinders **84** through ports **92** connected by piping **94** to the hydraulic pressure system, not shown.

The apparatus **10** is further provided with fluid bleed means **96** for permitting the air between the asbestos fibers to be expelled therefrom during compression of the fibrous material to produce a relatively firm block, such as indicated at **28**. The fluid bleed means **96** consists of a series of apertures **98** in both side walls **16**, in the bottom wall **20**, and in gates **82**. The apertures **98** may be either of a substantially conical shape, as indicated at **100** in Fig. 8, particularly adapted for coarser fibers, or of a substantially cylindrical type with a narrowed down portion, as indicated at **102** in Fig. 9, particularly adapted for finer fibers. Either type, as indicated at **100** or **102**, of aperture **98** is particularly adapted for self-cleaning by being formed with a portion of relatively narrow cross-section, as indicated at **101** and **103**, respectively, for only a short length, while the remaining portion extending for the rest of the length of the aperture **98** is formed with a relatively larger cross-section, as indicated at **105** or **107**, thereby preventing clogging of the apertures **98** with the fibers and permitting free flow of air therethrough. The apertures **98** are further arranged with the relatively narrow cross-section portion **101** or **103** extending from the inner side of each wall of the chamber **26**, thereby preventing the fibers from easily passing through the apertures **98**. However, any fibers that may pass through the narrow cross-section portion **101** or **103** will be easily drawn from the larger cross-section portion **105** or **107**, and thereby clogging of the apertures **98** will be prevented.

In order to prevent any fibers or dust which might escape through the apertures **98** from accumulating in the area around the casing **12**, the apparatus **10** may be also provided with dust proof means **104** consisting of sheet metal exhaust hoods **106** attached to the side walls **16** and completely covering the perforated portion of the side walls **16** and the bottom wall **20**. A fan system, not shown, may be provided for drawing the air through the apertures **98**, and any fibers or dust escaping through the apertures **98**. One of the side walls **16** may also be provided with an opening **108** at the upper portion thereof and adjacent to the top wall **18** for likewise drawing any fibers or dust accumulated in the upper portion of the casing **12**.

In operation, the fibrous material to be compressed is fed into the chamber **26** from a hopper, not shown, through the chute **32** and opening **30**, which fibrous material may be stacked on the bottom wall **20** up to substantially the level of the opening **30**, while the plunger **34** has been raised to the upper end of its stroke, as shown by the dotted line in Fig. 2. After the chamber **26** has been filled with the fibrous material, the plunger **34** is started on its downward stroke, compressing the fibers, and when it reaches its lower position, as shown in Fig. 2, the fibrous material has been laterally compressed into the relatively firm block **28**, as shown in Fig. 3. At the end of the downward stroke of the plunger **34**, the plunger **60** may be automatically actuated, and the gates **82** be retracted into an open position thereby permitting the plunger **60** to eject the fibrous block **28** endwise from the chamber **26** into the chute **76**. At the end of its stroke, as shown by a dotted line in Fig. 4, the plunger **60** has pushed the fibrous block **28** against the bottom of the bag **78**, thereby sliding the bag **78** off the chute **76** with the fibrous block **28** therein. The bag **78** containing the fibrous block **28** may fall on a conveyor system, not shown, for carrying the same away. For the automatic operation of the plungers **34** and **60**, and the gates **82** of the closure means, any well-known electrically controlled hydraulic system may be employed, such as disclosed in Letters Patent of the United States of America No. 2,682,-137, issued to C. W. Cox on June 29, 1954.

The present invention has been described in detail above for purposes of illustration only and is not intended to be limited by this description or otherwise except as defined in the appended claims.

What we claim is:

1. Apparatus for packing loose asbestos fibrous material, comprising an enclosed compression chamber having walls provided with slots circumferentially therearound, a vertically reciprocable plunger extending longitudinally in said chamber for laterally compressing loose asbestos fiber material contained in said chamber, said slots being relatively closely spaced and being much longer than they are wide adjacent the inner faces of said wall, said slots being arranged adjacent the upper portion of the compression chamber with the long dimension extending parallel to the direction of travel of said plunger and arranged adjacent the terminus of the compression chamber with the long dimension transverse to the direction of travel of said plunger, said wall slots permitting air to escape from said chamber during compression of the fibrous material, and said wall slots being of greater cross-sectional area at the outer portion of the chamber as compared to the cross-sectional area at the inner portion of the chamber, a horizontally reciprocable plunger extending laterally in said chamber for applying pressure to the compressed fibrous material endwise thereof, wrapper holding means extending laterally from said chamber and in communication therewith, and closure means in said chamber for permitting transfer of the compressed fibrous material from said chamber into a wrapper held by said wrapper-holding means.

2. Apparatus for packing asbestos fibers, comprising an elongated compression chamber enclosed by lateral walls, means within said chamber for admitting loose asbestos fiber into said chamber, plunger means for compressing the asbestos fibers, said walls having first and second slots therein which enlarge in cross-sectional area from the chamber-side of the walls to the exterior side of the walls, said first slots being elongated in the direction of travel of said plunger means and being located

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along a substantial portion of the upper portion of the lateral area of said walls, said second slots being elongated transverse to the direction of travel of said plunger means and being located adjacent the terminus of the compression chamber, and all of said slots permitting air between the asbestos fibers to be expelled therefrom during compression thereof, thereby producing a substantially free-of-air relatively firm block of asbestos fibers.

3. Apparatus for packing asbestos fibers and the like as defined in claim 2, and dustproof means in communication with said compression chamber perforated walls

for arresting any fibers discharged through said slotted walls.

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