United States Patent

Mersfelder

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[54] COMPRESSION DEVICE

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[22] Filed: **Dec. 28, 1970**

[21] Appl. No.: **102,222**

Related U.S. Application Data

[63] Substitute for Ser. No. 729,630, May 16, 1968, abandoned.

[52] **U.S. Cl.** **100/90**, 100/108, 100/218, 53/124

[51] **Int. Cl.** **B30b 9/00**, B30b 9/02, B30b 15/32

[58] **Field of Search** ..... 100/90, 107, 108, 218; 53/79, 53/124 D

[56] **References Cited**

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Primary Examiner—Peter Feldman

[57] **ABSTRACT**

A compression device incorporating an ejection ram having an air extracting needle associated therewith for introduction into the substance being compressed. The air extracting needle is communicated with the atmosphere and provides a flow path for the entrained air within the material during the compression thereof.

10 Claims, 6 Drawing Figures

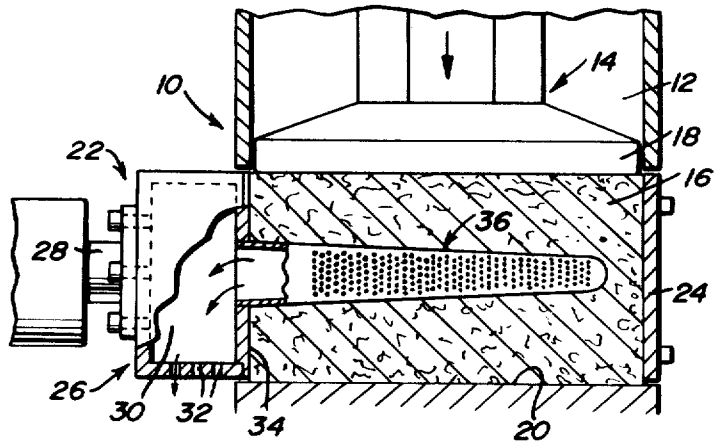


Fig. 1

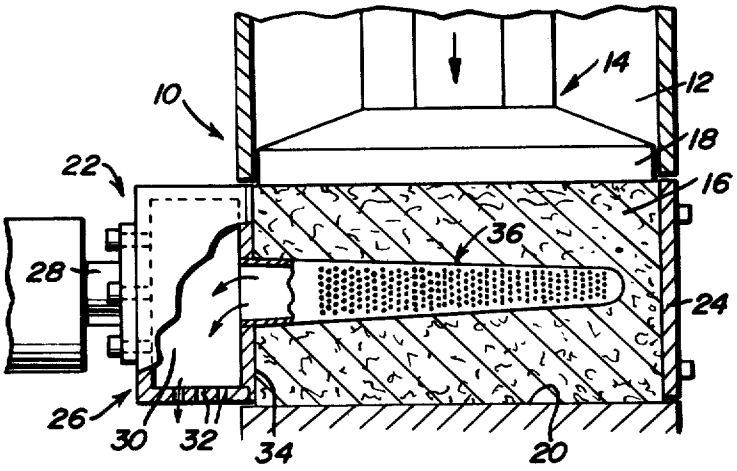


Fig. 2

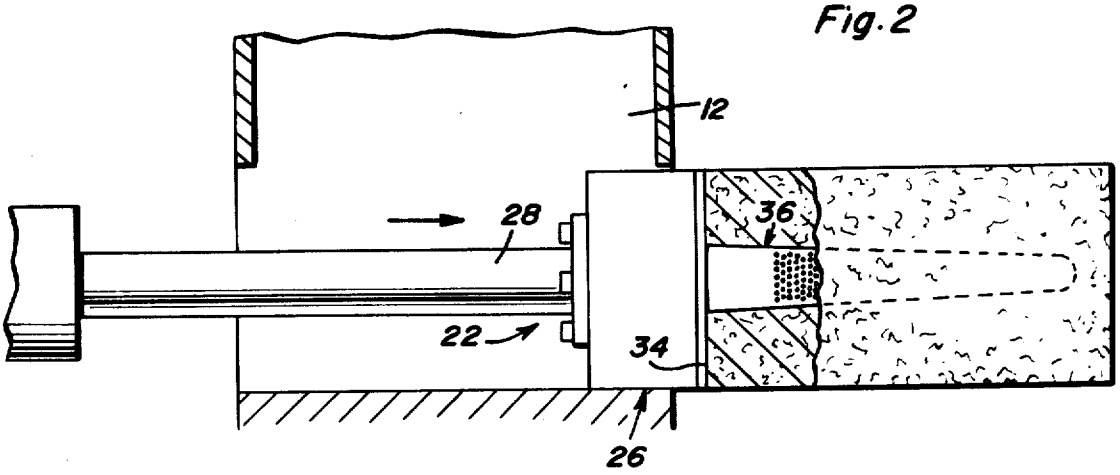


Fig. 3

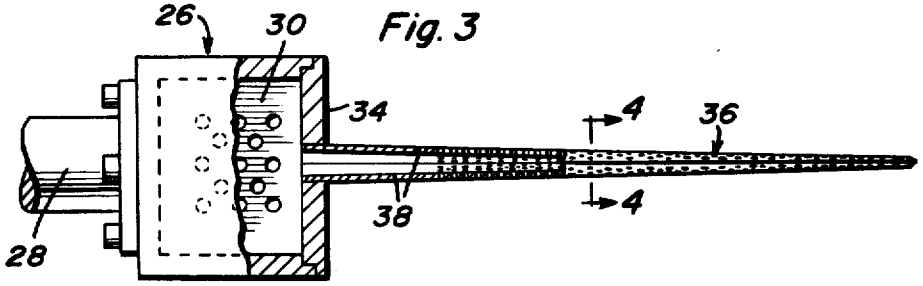


Fig. 5

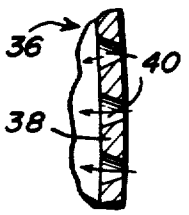


Fig. 4

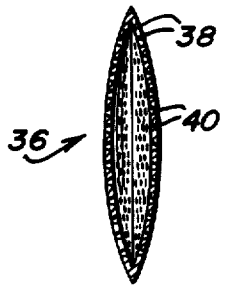
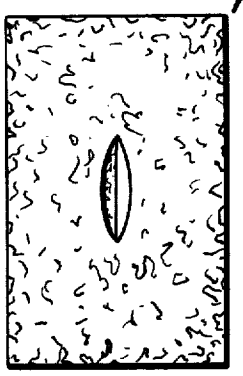


Fig. 6



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COMPRESSION DEVICE

It is noted that this application is a substitute application of application 729,630, filed May 16, 1968, which became abandoned on June 9, 1970.

The instant invention is generally concerned with bulk material, and more particularly relates to means for reducing the bulk of compacted material so as to facilitate handling, shipping and storing.

Bulk material industries are continuously searching for ways and means to reduce the bulk of the various products which they handle for purposes of facilitating handling, shipping and storing of the material. This reduction of bulk is accomplished in many products through a compressing of the material in a manner so as to drive or squeeze out the entrained or entrapped air, the compressed material subsequently being placed within suitable containers. Some materials, such as for example asbestos, require a considerable time to release the entrapped air, this being proportionate to the volume and porosity of the material being handled.

It is a primary object of the instant invention to provide a device, particularly, although not exclusively adapted for use in the compacting of asbestos, which specifically provides a flow path within the material being compressed for the rapid extraction of the entrapped air during the material compressing operation. In this manner, not only is a more compact product produced, but the time necessary in effecting the compaction of the material and the extraction of the air is substantially reduced.

In conjunction with the above object, it is a significant object of the instant invention to provide means for enabling the escape of the entrapped air which does not impede the basic material compressing operation, requiring no additional steps in achieving the desired compacted unit or product.

Basically, the objects of the instant invention are achieved through the provision of a device which includes a compression chamber into which the material is compressed by a longitudinally moving compression ram, and from which the compressed product is ejected by a transversely moving ejection ram. The ejection ram itself mounts a forwardly projecting hollow perforated needle which is received centrally through a major portion of the material being compressed, this hollow needle communicating with the atmosphere outside of the compression chamber so as to provide for a clear flow path for the escape of the trapped air. Subsequent to a completion of the compressing operation, the ejection ram moves forwardly so as to discharge the compressed product through a removable gate, the needle remaining in the product during the ejection movement of the ejection ram and retracting therefrom upon a retraction of the ejection ram.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. 1 is a cross-sectional elevational view through the device of the instant invention;

FIG. 2 is a view similar to FIG. 1 with the ejection ram fully extended and the product ejected from the compression chamber;

FIG. 3 is a top plan view of the ejection ram and the extracting needle, portions broken away for purposes of illustration;

FIG. 4 is an enlarged cross-sectional view taken substantially on a plane passing along line 4—4 in FIG. 3;

FIG. 5 is an enlarged cross-sectional detail illustrating the tapered configuration of the air passing holes in the needle; and

FIG. 6 is an end elevational view of the compressed block or product.

Referring now more specifically to the drawings, reference numeral **10** is used to generally designate the compression device comprising the instant invention.

The compression device **10** includes a compression chamber **12** within which a compression ram **14** longitudinally moves so as to effect a compressing or compacting of asbestos or like material **16** between an enlarged chamber filling compression head **18** on the ram **14**, and an appropriate forming surface **20** at one end of the chamber **12**. The material **16** will of course be introduced into the compression chamber **12** in any suitable manner, such as possibly through a complete retraction of the compression ram **14** therefrom.

A finished product ejection ram **22** is mounted for movement transversely across the compression chamber **12** adjacent the forming surface **20** at a position so as to engage the compressed unit and eject the unit transversely from the far side of the compression chamber **12** upon the removal of a gate **24** which, as will be appreciated, is rigidly retained in position in any suitable manner during the compressing operation. The ejection ram **22** includes an enlarged head **26** affixed to the forward end of a power controlled piston **28**. The head includes a hollow internal air chamber **30** communicated with the atmosphere through a plurality of air passing holes **32**. The forward face **34** of the ejection ram head **26** is flat and corresponds in size to the product being ejected, and in fact constitutes a forming face for one end of the product during the compressing operation, this face **34** aligning with and constituting a portion of the adjoining chamber wall.

Mounted on and projecting forwardly from the center of the ejection ram head **26** is an elongated air extracting needle **36** of a length slightly less than the transverse width of the compression chamber **12**. The needle **36** tapers gradually forwardly, and is of a decreasing narrow, vertical generally elliptical configuration as best seen in FIG. **4**. The needle **36** is of course hollow throughout the length thereof with the rear or mounted end being affixed to the forward portion of the ejector ram head **26** in communication with the interior air chamber **30**. The opposed walls **38** of the needle **36**, these walls **38** also converging gradually toward each other toward the rounded forward end of the needle **36**, are provided with a plurality of air passing holes **40** along a major portion thereof.

With reference to FIG. **5**, it will be noted that the air passing holes **40** in the needle walls **38** are of a tapered or conical configuration, enlarging inwardly toward the interior of the needle **36**, thus substantially eliminating any tendency for the material **16** to clog these holes **40** as the entrapped air is being extracted.

In actual operation, the needle **36** is positioned within the material **16** to be compressed, with the forward face of the ejection ram head **26** being positioned so as to define a continuation of the wall of the chamber **12**. The compression of the material **16** then takes place through the compression ram **14** moving thereagainst, the entrapped air within the material **16** being both easily and quickly released through the needle **36** which receives the air and passes the air rearwardly therethrough into the air chamber **30** defined within the head **26**, and from there through the air passing holes **32** to the atmosphere. Upon a completion of the compressing operation, the gate **24** is opened or removed and the ejector ram **22** is extended so as to laterally eject the finished product or cake from the compression chamber **12**. During this ejection of the finished product, the needle **36**, as will be appreciated from FIG. **2**, travels along therewith with the needle **36** withdrawing from the finished unit upon a retraction of the ejector ram. It will be appreciated that the tapered configuration of the needle **36** facilitates its withdrawal as the finished unit or cake is stabilized in any suitable manner. Thus, the finished compressed product will, as illustrated in FIG. **6**, appear as a tightly compacted unit capable of being handled without fear that the unit will fall apart or crumble. It will be appreciated that the narrow generally elliptical configuration of the needle **36** orientated in a plane perpendicular to that of the compression head **18** enables the material to be effectively compressed thereabout with substantially no restriction thereto, the material flowing smoothly about the narrow tapering upper and lower edges of the needle.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A bulk material compression device comprising a compression chamber, a compression ram movable in said chamber for compression of received material against a forming member, an ejection ram movable transversely across said chamber between said compression ram and the forming member for transverse ejection of a formed product, and an air extracting needle on and movable with said ejection ram projecting forwardly therefrom for embedment within the material to be compressed, said extraction needle communicating with the atmosphere outside of at least that portion of the compression chamber between the compression ram and the forming member.

2. The device of claim 1 wherein said needle is hollow and includes a plurality of air passages therethrough communicating with the hollow interior of the needle.

3. The device of claim 2 wherein said needle is of a tapering configuration decreasing in cross-section forward from the ejection ram.

4. The device of claim 3 wherein said needle comprises opposed elongated walls, said walls having engaged upper and lower edges and being slightly convex relative to each other between said edges so as to define a narrow relatively sharp edged configuration.

5. The device of claim 4 wherein said needle is orientated with the edges thereof in a plane perpendicular to the compression ram.

6. The device of claim 5 wherein said ejection ram includes a head defining a hollow air chamber, said needle being mounted on said head with the hollow interior of the needle communicating with the hollow chamber of the head, and air passage means communicating the head chamber with the atmosphere.

7. The device of claim 2 wherein said ejection ram includes a head defining a hollow air chamber, said needle being mounted on said head with the hollow interior of the needle communicating with the hollow chamber of the head, and air passage means communicating the head chamber with the atmosphere.

8. For use in a material compressing device including a compression chamber, an ejection ram adapted for transverse movement across the chamber, said ejection ram including a forwardly projecting chamber received elongated air extracting needle mounted thereon and movable therewith, said ejection ram including a head defining a hollow air chamber, said needle being mounted on said head, air passage means through said needle and communicated with the hollow chamber of the head, and air passage means communicating said head chamber with the atmosphere.

9. The device of claim 8 wherein said needle is of a tapering configuration decreasing in cross-section forward from the ejection ram, said needle including opposed elongated walls, said walls having engaged upper and lower edges and being slightly convex relative to each other between said edges so as to define a narrow relatively sharp edged configuration.

10. The device of claim 9 wherein said needle air passage means includes a plurality of holes through the needle walls, said holes being of an inwardly enlarged tapered configuration.

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