April 27, 1937. R. M. BRUESEWITZ 2,078,525

METHOD OF PENETRATING FIBROUS MATERIAL

Filed Aug. 22, 1936

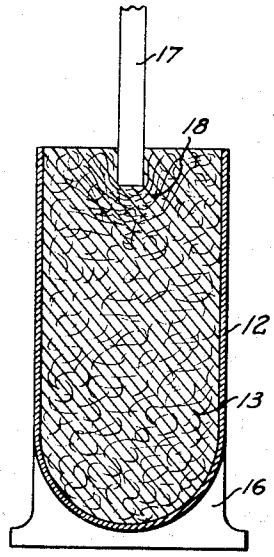

Fig. 1

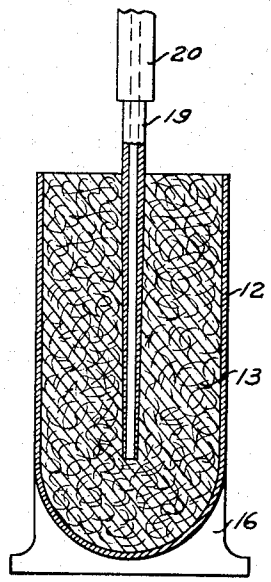

Fig. 2

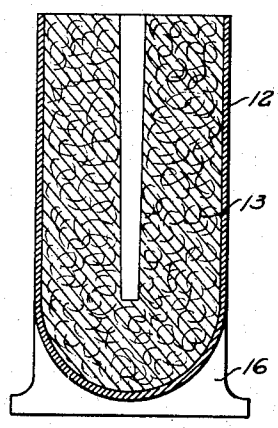

Fig. 3

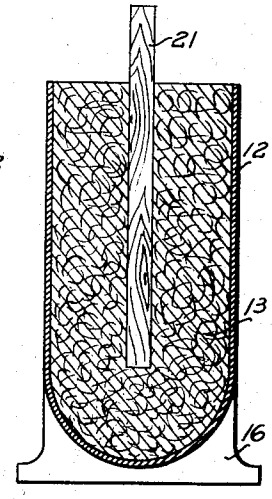

Fig. 4

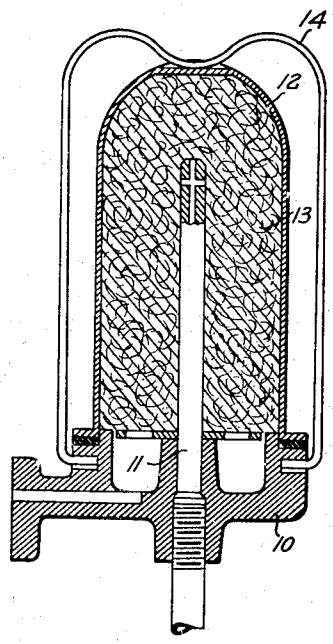

Fig. 5

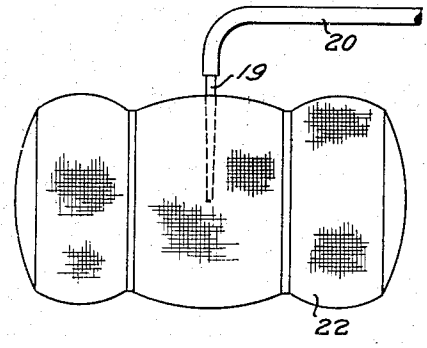

Fig. 6

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METHOD OF PENETRATING FIBROUS MATERIAL

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Application August 22, 1936, Serial No. 97,475

8 Claims. (Cl. 210—204)

This invention relates primarily to a method of penetrating or making a passage in a mass of fibrous material, especially fibrous material which is in a packed condition.

It is often desirable to penetrate a fibrous mass of material in which the individual fibers may be haphazardly intertwined. Examples of such masses of fibrous material are: bales of cotton, packed cotton waste, stacks or bales of hay, excelsior, yarn, etc. It may be desired to pass a rod through such a mass of fibrous material or create a passage for impregnating the mass or for other reasons. It is practically impossible to make such a passage or to insert a rod into a mass of packed cotton waste, for example, by simply attempting to force either a sharp or a dull instrument therein. According to this invention the penetration of fibrous material is effected by advancing through such material a hollow tube or mandrel through which fluid under pressure, such as compressed air, is forced. The fluid forces the fibers aside and makes it possible to advance the tube or nozzle into the material with great ease.

It is an object of this invention to provide a method of penetrating a mass of fibrous material.

It is another object of this invention to provide a method for making passages or recesses within a mass of fibrous material.

It is another object to utilize the above identified method in providing a new method of making filters.

It is also an object of this invention to utilize the above method in providing a new method for impregnating baled materials.

Other objects will become apparent from the specification and the appended claims.

For a better understanding of this invention attention is directed to the accompanying figures in which:

Fig. 1 is a vertical, sectional view of a container filled with fibrous material, and illustrates the difficulty of forcing a passage therethrough;

Fig. 2 is a similar view illustrating a step in the method of penetrating a fibrous mass in accordance with this invention;

Fig. 3 is a view similar to Fig. 2 showing the nozzle removed from the recess;

Fig. 4 is a view similar to Fig. 2 showing a temporary filler in the recess;

Fig. 5 is a vertical sectional view showing a filter made in accordance with this invention; and

Fig. 6 illustrates the application of this invention to the impregnation of baled fibrous material.

While it is clear that this method is applicable to a wide variety of fibrous material, a lubricating oil filter packed with cotton waste will be used for purposes of illustration. This filter forms the subject matter of copending application Serial No. 97,337, filed concurrently with this application.

The filter (Fig. 5) comprises a base 10 provided with inlet and outlet ports to which base is fixed tube 11, which forms a continuation for one of said ports. Removably mounted on the base is an inverted container 12 filled with fibrous filtering material 13 which may be tightly packed cotton waste. A wire bail 14 is used to retain the container in place.

When the filtering material 13 becomes clogged with impurities, it is necessary to replace container 12 with another similar container filled with fresh filtering material, but such new container cannot be mounted on base 10 unless a recess is first provided in the material to receive tube 11. In order to provide such a recess in the prior art it was necessary to locate a mandrel corresponding in size and position to the size and position of tube 11 in container 12, and then pack cotton waste in layers in the container around said mandrel. The space occupied by the mandrel would provide a recess for the reception of tube 11. This was a time consuming process.

It was attempted to obviate these difficulties by proceeding in the manner illustrated in Fig. 1. The receptacle 12 is positioned in a stand 16 and tightly packed with cotton waste 13. Then it was attempted to provide a central recess by forcing a rod 17 into the cotton waste. It was found to be impossible to do this. The advancing rod caught the adjacent fibers and pushed them forward causing them to pack even more tightly, as indicated at 18, and preventing further advance of the rod. Tapered and round nosed rods were also tried without success.

The method according to the invention is best shown in Fig. 2. The container 12 is mounted in stand 16 and packed with cotton waste by simply taking a wad of cotton waste and forcing it into the container. This, it will be noted, results in a tremendous saving in time over the prior method of carefully inserting the cotton in layers into the container around the central mandrel. To cause better adhesion of the cotton waste to the container, the interior of the container may first be coated with varnish, and the

cotton waste packed therein while the varnish is still fresh.

The longitudinal recess in the packed cotton is formed by means of a nozzle 19 which may be attached to a source of fluid under pressure (hereafter referred to as air) by means of hose 20. The compressed air issuing from the tip of the nozzle divides the fibers immediately in front of the nozzle, pushing them aside laterally from the axis of the nozzle, making it possible to advance the nozzle into the material. As the nozzle advances the compressed air continues to divide the fibers in advance of the nozzle, opening a path for the nozzle. It has been found in practice that the best way to advance the nozzle into the fibrous material is by an intermittent or step-by-step forward motion. Any attempt to advance the nozzle faster than the compressed air prepares a path for it does not result in faster progress, and may even delay it. This indicates quite clearly that the fibers are pushed aside by the compressed air and not by the nozzle itself. As shown in Fig. 2 a nozzle with a slight taper is preferred, the taper being exaggerated for purposes of illustration. The opening in the nozzle must be large enough to supply the necessary amount of air.

As compared with the prior method of packing the cotton waste around a temporary mandrel which consumed an average of about three minutes per container, the present method of filling the container with a wad of cotton and making a recess therein with the aid of compressed air takes less than a minute. In practice the container is fastened in a jig, filled with a single wad of cotton waste, and the nozzle is carried in a guide axially of the container, facilitating the insertion of the nozzle in the exact center of the container.

While the method has been illustrated as applied to the preparation of a filter, it is obvious that it may be applied to a wide variety of purposes where it is desired to penetrate a mass of fibrous material. One such application is illustrated in Fig. 6 wherein 22 may be a bale of cotton which it is desired to impregnate with a preservative or a bale of hay which is to be impregnated with molasses. The nozzle 19 is advanced into the interior of the bale with the aid of compressed air supplied thereto through hose 20. After the desired penetration has been obtained the desired fluid is forced under pressure into the passage thus made either by using the same nozzle 19 or by means of another nozzle of any desired construction. If desired, the fluid which is to be used for impregnating the fibrous material may also be used instead of the compressed air to make a path for the advancing nozzle.

Changes in details and specific arrangement of parts may be made without departing from the spirit of the invention, which is to be limited only by the scope of the appended claims.

It is claimed and desired to secure by Letters Patent:

1. The method of making a passage through a mass of fibrous material which comprises dividing the fibers by directing a stream of compressed gas into the material by means of a tapered tube with the reduced end foremost and intermittently advancing the tube through the passage thus made.

2. The method of making a passage through a mass of fibrous material which comprises directing a stream of compressed gas into the material by means of a tube and successively advancing the tube into the passage as it is formed by an intermittent forward movement.

3. The method of making a recess in a mass of packed waste which comprises directing a stream of compressed gas into the material by means of a tube and advancing the tube into the material as the gas clears a path therefor and then removing the tube.

4. The method of making an oil filter cartridge which comprises packing a container with a mass of fibrous filtering material, making a long narrow recess therein by advancing an open tube into the material while forcing compressed gas out through the forward end of the tube, and removing the tube.

5. The method of making an oil filter cartridge which comprises packing a container with a mass of fibrous filtering material, making a long narrow recess therein by advancing an open tube into the material while forcing compressed gas out through the forward end of the tube, removing the tube, and inserting a temporary filler rod into the recess thus made.

6. The method of making an oil filter cartridge which comprises coating the interior of a container with varnish, packing a wad of fibrous material into the container while the varnish is still fresh, providing an aperture in the material by advancing a hollow tube into the material and clearing a path therefor by a stream of compressed gas passing through said tube, and withdrawing the tube to leave a recess of predetermined dimensions within the material.

7. The method of penetrating fibrous material which comprises directing a stream of compressed gas into the material by means of a tube and successively advancing the tube through the space cleared by the compressed gas.

8. The method of impregnating a package of fibrous material which comprises making a passage to the interior of the package by directing a stream of compressed gas into the material while inserting a tool into the passage cleared by said stream of gas, removing the tool and applying impregnating fluid into the package through the passage thus made.

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