Oct. 25, 1966 J. W. I. HEIJNIS 3,280,542

FILTER PACK FOR UNIFORM DISTRIBUTION OF AIR

Original Filed Oct. 16, 1961

FIG. 1

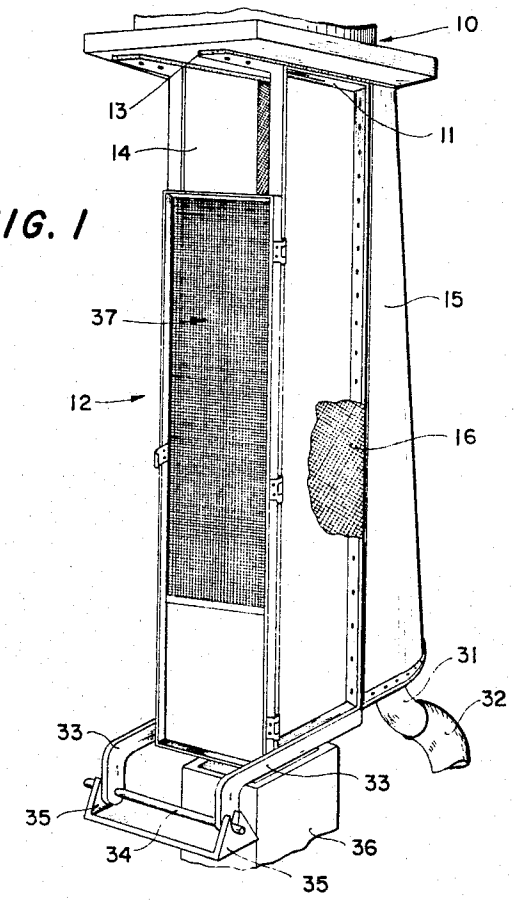


FIG. 2

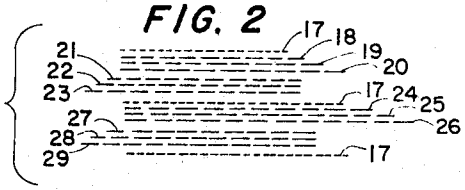


FIG. 4

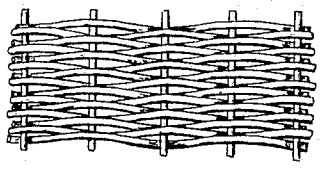
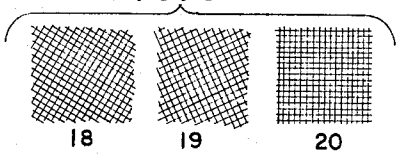


FIG. 3



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FILTER PACK FOR UNIFORM DISTRIBUTION OF AIR

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Continuation of application Ser. No. 145,293, Oct. 16, 1961. This application June 26, 1964, Ser. No. 380,978
Claims priority, application Netherlands, Nov. 3, 1960, 257,588
2 Claims. (Cl. 55—485)

This application is a continuing application of copending application Serial No. 145,293, filed October 16, 1961, now abandoned.

This invention relates generally to an improved device for the manufacture of artificial threads according to the melt spinning process and more particularly to the type of process in which one or more spinnerets terminate at the upper end of a rectangular spinning cell, or blow box. One wall of the cell consists, at least partly, of a number of parallel gauze layers with the space behind these layers being connected to an air-supply system, the two side walls adjoining this gauze wall being directed at right angles to the latter. The layers of gauze are positioned one against the other to form a pack. The layers in this pack vary in fineness, and both decrease and increase, successively, in the direction of the gaseous cooling medium flow, as described in Netherlands Patent No. 92,197.

The purpose of the gauze pack is to insure that the air from the air-supply system flows through the spinning cell over the whole height and width of the blow box at a constant speed and without whirls or other turbulence. A further condition for satisfactory operation is retention of this property even after use for a prolonged period of time.

In order to insure that air flows into the spinning cell at a constant speed, it has been proposed that textile fabrics and felt be placed between the air-supply system and the spinning cells. See, for example, French Patent No. 50,571 (addition to French Patent No. 851,437). Although the application of these pressure-balancing and flow-regulating materials gives a greater denier regularity to the threads manufactured, favorable action of these materials soon decreases because of contamination due to the filtering function. To alleviate this problem, the aforesaid Netherlands patent suggests positioning of the layers of gauze one against the other with successive layers in the pack thus formed being of different fineness which both decreases and increases, in the direction of flow of the gaseous cooling medium.

Experiments have shown that such a pack of gauze screens equalizes to a large extent the initial difference in air velocity which was present in the gas flow, in a direction transverse to air motion before passage through the pack of gauze screens. Further, it has been found that such a pack can be easily cleaned. The gauzes which are used to form the pack may consist of various types of metals or plastics. In view of the rather high temperatures occurring in melt spinning, however, application of metal gauzes is preferred.

Notwithstanding the above-mentioned advantages, there are still some shortcomings to the use of this known gauze wall. For example, the known gauze wall or pack must be formed from at least four different types or varieties of gauze, among which are very fine gauzes having a wire thickness of 0.15 mm. The fine gauzes serve to diffuse the air stream so that the air flow is distributed evenly in a transverse direction between the relatively coarse gauzes, and are of course extremely delicate. Moreover, a gauze wall composed of various types of gauze, some of which are very fine and costly, is objectionable from a technical and from an economical point of view. When attempting to uniformly tension any accumulated slack in the pack, difficulties arise due to the fine gauzes being positioned between the relatively coarse ones. Moreover, the resistance to air flow of the very fine gauzes increases with the fineness. Further, the composition of the gauze wall must be such that the number of fine gauzes is restricted to a minimum in order to reduce the pumping work required to provide adequate air pressure. With the known systems, however, it was not found possible to obtain a sufficiently satisfactory distribution of air without using very fine gauzes.

Accordingly, it is an object of this invention to provide an improved gauze or wall pack not having the inherent disadvantages found in the known systems.

A primary object is to provide a gauze wall which will permit a uniform distribution of cooling air across the spinning cell without resort to the fine mesh gauzes heretofore used.

These objects are accomplished by the following invention which comprises compiling a pack of gauze of a number of gauze screens of the plain Dutch weave type in which adjacent or adjoining gauze screens are separated by a number of intermediate layers of a symmetrical gauze. The intermediate gauze layers are termed symmetrical in that the gauze density, i.e., the number of wire strands per unit distance, is the same in the warp direction as in the weft direction. All of the intermediate layers of gauze have the same mesh size and are oriented in such a manner that, in their plane, the successive layers are rotated relative to each other through an acute angle. It has been found that in the direction of their plane the gauze screens of the plain Dutch weave type are very porous and that, surprisingly, by turning the intermediate identical gauzes relative to each other a more satisfactory air dispersion filter having longer life is obtained than by a combination of semi-coarse and very fine gauzes.

A gauze wall composed according to the invention consists of only two types of gauze, both of which are considerably stronger than the fine gauzes previously used. Moreover, it has been found that the improved gauze wall permits a far better distribution of air with a constant flow and at the same time offers less resistance to air flow. This is true because, according to the invention, the intermediate layers of gauze of the same mesh size are successively turned relative to each other in the same sense and through the same angle, which preferably is 30°.

A simple and very satisfactory construction of the gauze wall according to the invention comprises three gauzes of the plain Dutch weave type of which each two or adjoining pairs are separated by six identical gauzes, rotated consecutively through an acute angle.

It is advantageous to choose the gauzes of the plain Dutch weave type such that per linear decimeter (dm.) the warp consists of 48 lengths of wire 0.3 mm. in diameter and the weft of 440 lengths of wire 0.26 mm. in diameter, the symmetrical gauzes being so composed that per linear dm. the warp and the weft each consist of 64 lengths of wire 0.5 mm. thick. A gauze wall or pack composed in this manner has a thickness of 15 mm. The pressure drop throughout the wall, which is a measure of the resistance to air flow of the gauze wall, corresponds to a column of water about 0.9 mm. high at an air velocity of 20 cm./second. By way of comparison, it should be mentioned that this pressure drop is only one-fourth of that in the case of felt, and only one-thirtieth of that in the case of molleton.

Other objects and advantages will be apparent from the following detailed description of a preferred embodiment

of the invention taken in conjunction with the accompanying drawing, wherein:

FIGURE 1 is a perspective view of a spinning cell or blow box utilizing the filter pack of this invention;

FIGURE 2 shows schematically a sectional view of the filter or diffuser wall consisting of a pack of metal gauze screens;

FIGURE 3 shows the relative arrangement of a few representative gauze layers; and

FIGURE 4 is an illustration of a gauze screen of the plain Dutch weave type.

In the spinning assembly indicated generally at **10** are mounted conventional spinning pumps which are not shown in the drawing. On the underside of the spinning assembly there is located a spinneret with spinning orifices (also not shown). Connected to the flat underside of the spinning assembly **10** is the top flange **11** of a spinning cell or blow box **12**. On the top flange **11** of this box **12** a strip of asbestos **13** is provided for thermally insulating the same with respect to the spinning assembly **10**. This prevents the spinneret from cooling to the lower temperature prevailing in the blow box.

The blow box **12** is divided or separated into a spinning compartment **14** and an air chest **15** by the filter pack of metal gauze **16**, shown diagrammatically in FIGURE 1. The pack of metal gauze **16** is built up from three identical screens **17** of the plain Dutch weave type of gauze, adjoining screens being separated by six symmetrical gauze layers **18** to **29**, inclusive, arranged successively in the order layers **18**, **19**, and **20** are depicted in FIGURE 3. The screens **17** have a vertical warp comprising 48 lengths of wire per linear dm. and a horizontal weft of 440 lengths of wire per linear dm. The warp wire measures 0.3 mm. and the weft wire 0.26 mm. in diameter. FIGURE 4 shows, on an enlarged scale, a screen **17** constructed from bronze wire.

Both the wrap and the weft of the intermediate symmetrical gauze layers **18** to **29**, inclusive, consist of 64 lengths per linear dm. of wire 0.5 mm. in diameter. This gauze is made of tinned iron wire. The gauze layers **18** to **23**, inclusive, are so positioned in the pack that the warp of each gauze is turned through an angle or 30° relative to the warp of the preceding gauze. FIGURE 3 illustrates this relative arrangement. It will be evident that the warp of the gauze **18** runs parallel to the weft of the gauze **21**, and that the parallel arrangement will be similarly repeated on gauze layers **24** to **29**, inclusive, because of the 30° incremental and relative rotation between adjacent screens. FIGURE 2 is a diagrammatic compilation of the entire pack of gauze.

Air is supplied to the air chest **15** through inlet **31**, to which supply tube **32** is connected, and flows out evenly over the whole surface of the pack of wire gauze screens **16**. On the spinning box are further fitted, in a known way, brackets **33** which are rotatable around an offset axle **34** mounted in fixed supports **35**. For a more detailed description of this mounting arrangement, see U.S. Patent No. 2,947,029, owned in common with the present case. The underside of the spinning compartment **14** is positioned above the chimney **36** through which freshly extruded thread or yarn can be guided to a collector, not shown in the drawing. Finally, the front side of the spinning cell contains a door **37** provided with a gauze panel, by which said cell can be closed during spinning. This door, however, may be omitted if found to be unnecessary.

On spinning-in, the door **37** is opened and the blow box **12** is tilted over backwards. When the spinning-in has been completed, the box is tilted back to the process position and the gauze door **37** is closed. During spinning, air is supplied to the air chest **15** through the tube **32**.

The embodiment taken as an example in the foregoing description is a tiltable spinning box whose side walls are rigidly attached to the air chest. The packs of wire gauze may also be used in other spinning cells, for instance, in those which are rigidly mounted and in which the side walls are rotatably connected with the air chest. However, because the rotatable mounting of such side walls may give rise to leakage, the pressure-balancing action of the pack of gauze as herein described becomes less effective.

Inasmuch as many modifications will become apparent to those skilled in this art, it is intended that the present invention be limited in scope only to the extent set forth in the following claims.

What is claimed is:

1. A filter pack for uniform distribution of air through a blow box for a synthetic filament melt spinning system comprising at least three identical woven metallic gauze screens of the plain Dutch weave type and of identical mesh size wherein per linear decimeter the warp of said gauze screens comprises substantially fewer lengths of wire than the weft, each adjacent pair of said gauze screens being in contact with and separated by at least six idential superimposed layers of symmetrical metallic gauze of identical mesh size, the mesh size of the symmetrical metallic gauze being less than the mesh size of said Dutch weave screens and wherein per linear decimeter the warp of said gauze comprises the same number of lengths of wire as the weft, said gauze layers being so positioned in the pack that the warp of each gauze layer is turned at an acute angle of about 30° to the warp of the preceding gauze layer.

2. The apparatus of claim **1** wherein per linear decimeter, the warp of the said gauze screens of the plain Dutch weave type comprises 48 lengths of wire 0.3 mm. thick and the weft 440 lengths of wire 0.26 mm. thick, and wherein the wrap and the weft of the symmetrical gauzes each are made up of 64 lengths of wire 0.5 mm. thick per linear decimeter.

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