Feb. 25, 1969 R. J. HICKIN 3,429,434

PACKAGE AND METHOD OF FORMING SAME

Filed Nov. 10, 1966

Fig. 1

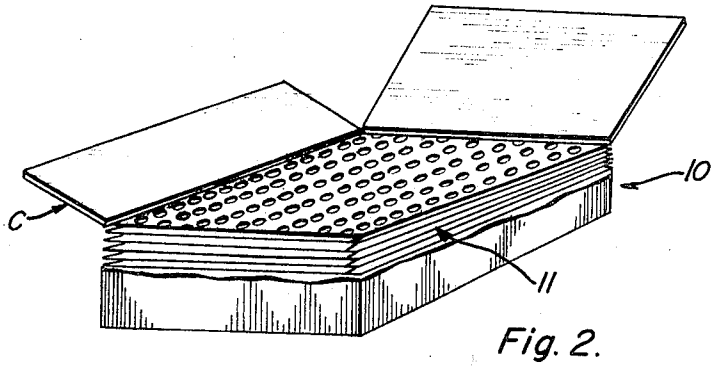


Fig. 2.

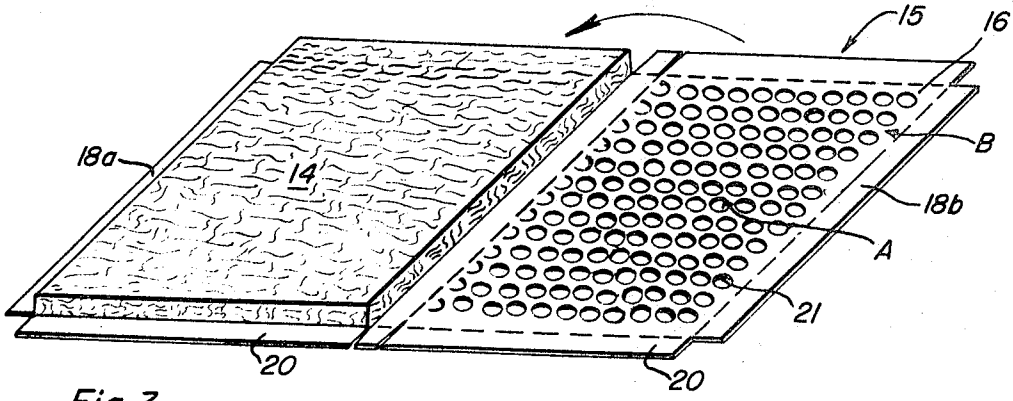


Fig. 3.

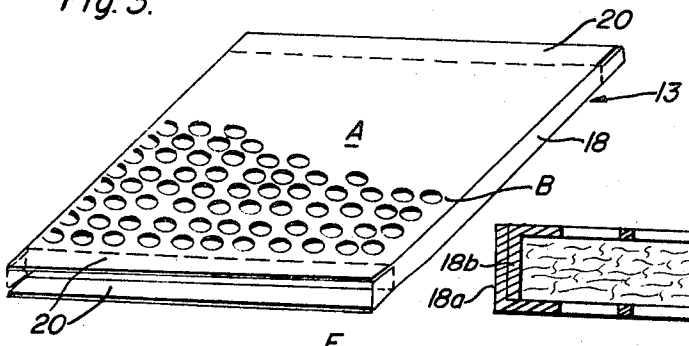


Fig. 4.

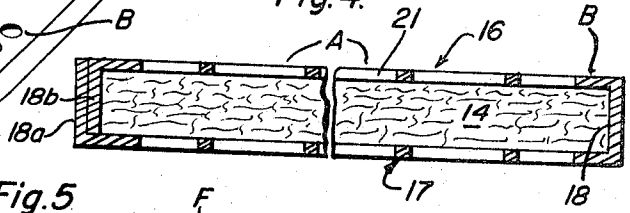
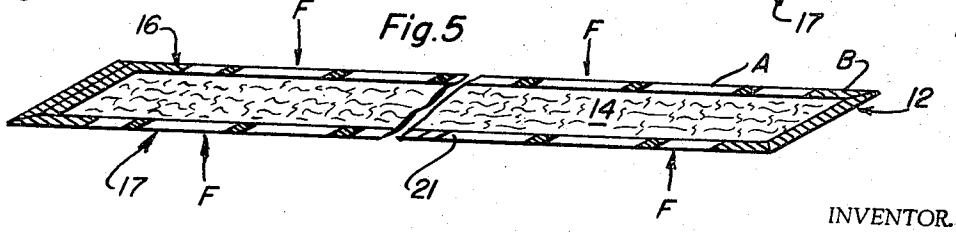


Fig. 5



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PACKAGE AND METHOD OF FORMING SAME

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U.S. Cl. 206—65 4 Claims
Int. Cl. B65d 71/00; B65b 63/02, 1/20

ABSTRACT OF THE DISCLOSURE

A package for accommodating a plurality of compressible units when the latter are arranged in stacked registered relation. The stack is compressed and retained in said compressed state for either storage or shipment. Each unit comprises a frame having broad top and bottom panels and narrow side walls foldably interconnecting corresponding peripheral portions of the panels. End closure flaps are foldably connected to other peripheral portions of the top and bottom panels of the frame and substantially delimit open ends when the unit is in a compressed state. Snugly disposed within the frame of each unit is a pliable resilient compressible pad. When the compressible unit is ready for use, it is removed from the stack and the closure flaps folded so as to close the ends of the frame whereby the frame imparts substantial rigidity to the unit.

Background of the invention

The units in question are adapted, when finally erected, to form filter units such as disclosed in my copending application Ser. No. 462,366 filed June 8, 1965. The filter units, suitable for use in forced air heating or cooling systems, are in this instance formed of two basic component parts: (a) a unitary fiberboard frame having broad, apertured top and bottom panels, and (b) a thin pliable pad snugly disposed within said frame and formed of a mass of spun-glass fibers or the like treated with a suitable substance whereby dust and dirt particles entrained in the air circulated through the unit, adhere to the pad fibers.

At the present time the component parts of the filter units are shipped separately to various geographically located facilities where the component parts are mechanically assembled and then the finished unit shipped to designated wholesale or retail customers. Because of the bulkiness of the finished filter units (i.e., an air filter 20 x 20 x 1 in size weighs 7¼ ounces and occupies 400 cubic inches) it is necessary from an economic and practical standpoint that the assembly facilities and the customers or commercial outlets be located reasonably close together.

The mechanical assembly of the filter units, while expeditiously accomplished, nevertheless requires costly and complex equipment and therefore where numerous assembly facilities are involved, the initial capital investment and overhead expenses associated with such equipment could be substantial.

Thus, it is an object of this invention to provide a package and method of forming same whereby the costly and complex equipment at the various facilities for assembling the units is eliminated.

It is a further object of this invention to reduce the shipping and handling costs involved in assembling the filter units or the like.

It is a further object of this invention to provide a method of packaging air filters or the like whereby the major steps of manufacturing said air filters are accomplished at a centralized location, and the final simple

manufacturing step is accomplished at various locations on small, rapidly convertible high speed equipment.

It is a still further object of this invention to provide a package for a plurality of units which is of a convenient size for the bulk handling, shipping, and/or storage of such units.

Further and additional objects will appear from the description, accompanying drawing, and appended claims.

In accordance with one embodiment of this invention a package is provided wherein a plurality of units are arranged in stacked relation. Each unit of the package comprises a collapsed tubular member open at opposite ends and having broad apertured top and bottom panels with opposite peripheral portions thereof foldably interconnected by elongated narrow side walls. Snugly disposed within the collapsed tubular member is a compressed resilient filter element.

For a more complete understanding of the invention reference should be made to the drawing wherein.

FIG. 1 is a fragmentary perspective view of one form of the improved package with a plurality of the units in a collapsed state disposed within a shipping container; the latter having portions thereof removed to partially expose the accommodated units;

FIG. 2 is an enlarged perspective view showing one method of partially assembling a filter unit;

FIG. 3 is an enlarged perspective view of an erected tubular member with a filter element disposed therein;

FIG. 4 is a fragmentary sectional view taken along line 4—4 of FIG. 3; and

FIG. 5 is similar to FIG. 4 but showing the tubular member in collapsed condition as would exist when the unit is disposed in stacked relation within the shipping container shown in FIG. 1.

Referring now to the drawing and more particularly to FIG. 1, one form of the improved package **10** is shown for use in the bulk handling of a plurality of units **11**, which in the illustrated embodiment are shown as comprising a unitary frame **12** formed as a collapsed tubular member **13** and a filter element or pad **14** disposed therein. The stack of such units is shown in FIG. 1 as being disposed within a conventional corrugated shipping container C.

The tubular member **13** in the illustrated embodiment is formed from a blank **15** of fiberboard and includes a broad top panel **16**, a broad bottom panel **17**, elongated narrow side panels or walls **18** which foldably interconnect corresponding peripheral portions of panels **16** and **17**, and end closure flaps **20** foldably connected to other peripheral portions of said panels. The blank **15** is of a type as disclosed in my aforeidentified copending application Ser. No. 462,366. In the illustrated tubular member **13**, the top and bottom panels **16** and **17** are of like construction and each has a large central portion A which is provided with a plurality of relatively large apertures **21** arranged in closely adjacent relation whereby the area of the apertures far exceeds the area of the panel separating said apertures thereby enabling air or a gaseous fluid to readily circulate through the panels. Panel portion A is encompassed by a narrow imperforate marginal portion B which is integral therewith.

The side panel **18** along one side of the tubular member **13**, as seen in FIGS. 4 and 5, is of two ply construction, the plies **18***a* and *b* thereof being adhesively secured or stapled together. If desired, however, only one ply may be used whereby a tape or some means can be utilized to form the tubular member **13**.

FIG. 2 illustrates one method of assembling the filter pad **14** within the tubular member **13**. With such method, the pad **14** is spotted onto bottom panel **17** prior to the blank **15** being initially folded. The configuration of pad **14** is such that it will be in coincident relation with

bottom panel **17** when it is spotted thereon. In order to prevent shifting of pad **14** once it is spotted on panel **17**, the back side or concealed surface of the panel **17** may have an adhesive applied thereto which will adhere to the adjacent surface fibers of the pad.

The pad is preferably an air permeable mass of commingled spun-glass fibers or the like which have been treated with a suitable substance that will cause the dust or dirt particles entrained in the circulating air or gaseous fluid to more readily adhere thereto. Pads formed of such material are resilient and readily compressible and are in common usage as a filtering medium.

Subsequent to pad **14** being spotted on the blank **15**, as shown in FIG. 2, the top panel **16** is folded so that it overlies the upper surface of the pad and is in registered relation therewith.

An alternative method of assembling the pad **14** within the tubular member **13** is to first form the tubular member, absent the pad, and then draw the pad into the erected tubular member through one of the open ends thereof. Such an operation can be accomplished by means of an extensible-retractable arm having a gripping device affixed to the distal end of the arm. The arm, when extended, passes through one end of the erected member until the gripping device projects beyond the other open end at which point the device grips one side of a pad and pulls the latter into the member as the arm is retracted.

Either method or still other methods may be employed and the disposition of the pad within the tubular member may be accomplished at the place where the blank is formed or at the place where the pad is fabricated. After the pad is disposed within the tubular member, compressive force F is applied to the top and bottom panels **16** and **17** (see FIG. 5) so as to cause the collapse of the tubular member—that is to say the top panel **16** and one of the side panels **18** are positioned to overlie the other side panel and the bottom panel so that a large obtuse angle is formed between the broad panel and one side panel and a small acute angle is formed between the same broad panel and the other side panel, see FIG. 5. The amount of compressive force exerted will depend upon the amount of collapse of the unit desired. The collapse of a unit may occur before or after a plurality of units are arranged in stacked relation. In addition the application of the compressive force may, if desired, occur simultaneously with the closing of a stack of units within the container C, see FIG. 1.

Because of the inherent resilient compressible character of pad **14**, and the pre-break of the foldline connections between the side panels **18** and top and bottom panels **16** and **17**, collapsing of the units is readily accomplished while the frame is in the form of a tubular member open at opposite ends. The spacesaving realized by collapsing the units is of utmost importance from both an economic and practical standpoint.

The units **11**, when packaged as shown in FIG. 1 are shipped as such to various strategically located distributors or facilities at which points the units are removed from the container C, erected, and then the end closure flaps **20** of each unit closed. The erection and closing of the end closure flaps of the units may be expeditiously accomplished mechanically by simple apparatus, the operation and function of which are well understood in the packaging art. After the end closure flaps are folded into closed condition, the pad **14** is completely enclosed within the frame and dimensional stability of the unit is attained whereupon the various units are then repacked in suitable quantities for shipment to the wholesale or retail customers.

Because of the ease and speed by which the units may be erected and the end closure flaps thereof closed, a large inventory of the collapsed units can be maintained by the distributor without occupying an undue or unreasonable amount of storage space.

The size and shape of the collapsed units **11** may vary from that shown without departing from the scope of the invention. In addition, an overwrap or band may be utilized in place of the container C so as to retain the collapsed units **11** in proper stacked relation.

Thus, it will be seen that an improved package and method of forming same has been provided which greatly facilitate the bulk handling and storage of a plurality of units such as furnace filters or the like. Furthermore, the method readily lends itself to automatic operation which may be performed at one convenient location whereby the final steps of forming a filter unit can be readily and inexpensively accomplished by distributors or the like located at various geographical locations remote from the said one location, but near to the consumer market.

The invention has heretofore been described and is hereinafter claimed with regard to filter units; however, this has been done merely by way of example and to facilitate understanding of the invention.

While various embodiments of the invention have heretofore been described, it is to be understood of course that the invention is not limited thereto, but further modifications are contemplated and it is intended by the appended claims to cover such modifications.

I claim:

1. A package comprising a plurality of compressible filter units arranged in a stacked registered relation, and shipping means engaging the top and bottom of said stacked units for exerting a compressive force thereon to reduce the height of said stack and retain said stacked units in a compressed registered state; each of said units being of composite construction and including a frame member formed of foldable sheet material and in a collapsed tubular condition open at opposite ends, and a pliable resilient compressible filtering pad in a compressed state snugly disposed within said collapsed frame member; said frame member including broad perforated top and bottom panels disposed in substantially coincident relation with respect to corresponding broad surfaces of the accommodated compressed pad, a pair of narrow side walls disposed on opposite sides of said top and bottom panels and connected thereto by foldlines, one of said side walls and a panel subtending the other side wall and panel when said unit is in said compressed state, and end closure flaps foldably connected to said panels and in substantial coplanar relation therewith and disposed at the open opposite ends of said collapsed frame member; said end closure flaps being foldable into end closing relation when said unit is in a non-compressed state whereby said frame member is non-collapsible and imparts substantial rigidity to said unit.

2. The package of claim **1** wherein said shipping means includes a shipping container having side walls delimiting the perimeter of each stacked unit, the height of said container being less than the height of the stack of units when the latter are in a non-compressed state.

3. A method of assembling and packing a plurality of partially formed filter units, each unit including a unitary frame provided with broad perforated top and bottom panels, narrow side walls foldably interconnecting corresponding peripheral portions of said panels, and end closure flaps foldably connected to other peripheral portions of said panels and in substantial coplanar relation with said respective panels; said panels, side walls and flaps cooperating with one another to form a tubular member open at oppoite ends, and a pliable resilient compressible filtering pad snugly disposed within said frame; said method comprising placing a plurality of said units in stacked registered relation, placing said stack in a shipping means, compressing the stack within said shipping means to reduce the height thereof, and closing said shipping means to conform to said compressed stack and retain said stack in said compressed state.

4. The method of claim **3** wherein said shipping means comprises a shipping container, the height of which is

less than the height of the stack when the latter is in a non-compressed state.

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U.S. Cl. X.R.

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