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APPARATUS FOR FILLING CONTAINERS

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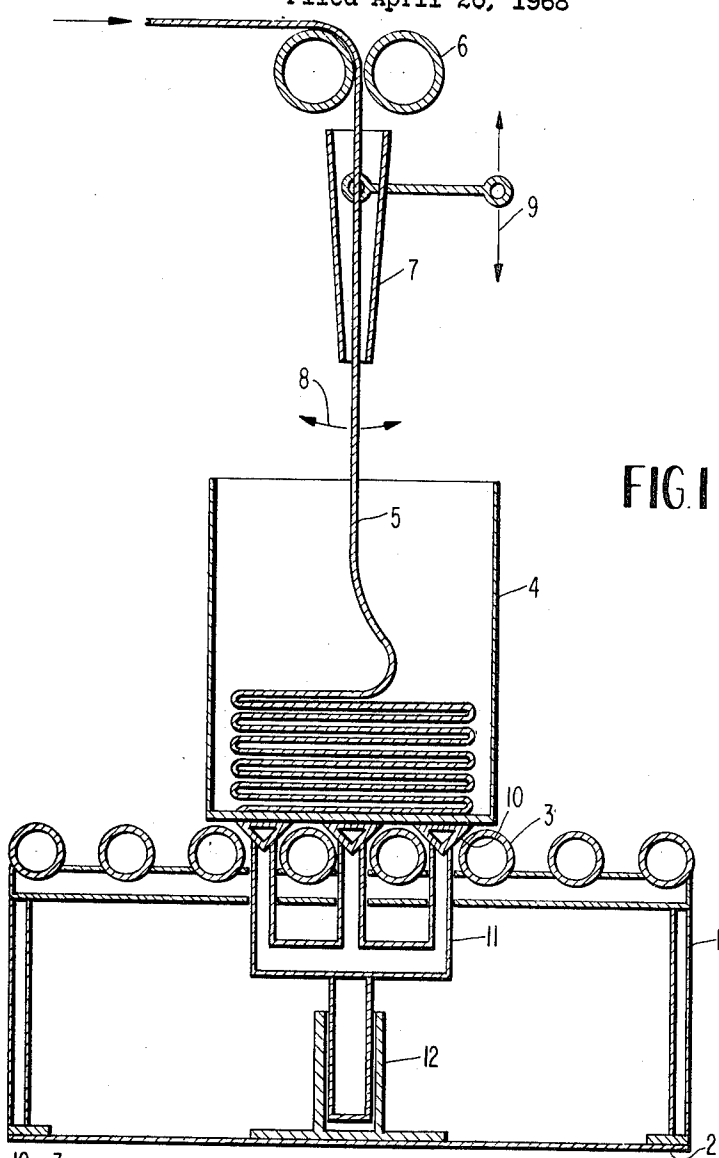


FIG. 1

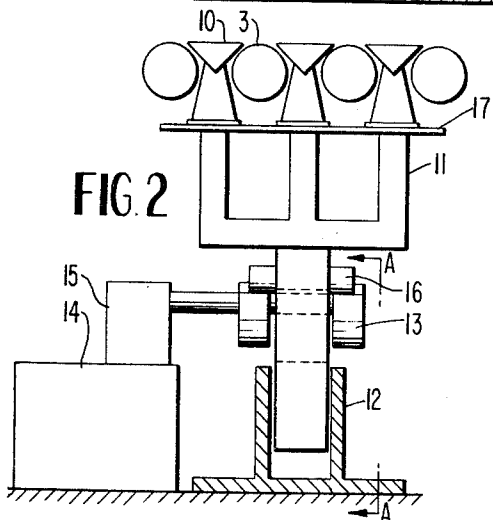


FIG. 2

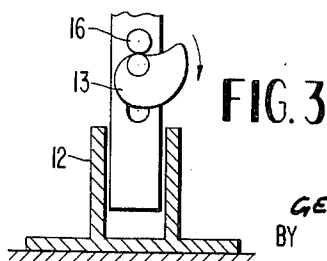


FIG. 3

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APPARATUS FOR FILLING CONTAINERS

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11 Claims

ABSTRACT OF THE DISCLOSURE

An apparatus for filling and packing material such as cables, silver combinings and other continuous groups of threads into a container which comprises a container means, means for introducing said materials into said container means in a zig-zag manner, a plurality of tappet means connected to lifting and lowering means and directly and simultaneously communicating with the bottom of said container thus providing lifting and lowering movements for the container means during the filling operation.

BACKGROUND OF THE INVENTION

This is a continuation-in-part application of application Ser. No. 408,196, filed Nov. 2, 1964 and now abandoned.

The present invention relates to a process and apparatus for filling band or sheet materials, cables, silver combinings and other continuous groups of threads or loose textile materials of any kind into containers such as cartons, boxes, or the like.

When employing conventional processes and apparatus for filling containers with any of the aforementioned materials, it is usually necessary to compress the material within the containers so that the largest possible amount thereof may be deposited in said container and so that the material will also be packed so tightly in said container that it cannot shift or be thrown around therein. This has previously been accomplished either by pressing the material together by hand or by interrupting the filling operation from time to time and inserting a mechanical compressing device into the container which compresses the material to a desired amount. However, both of these methods are unsatisfactory since a compression by hand can never be uniform at all points, while a mechanical compression requires complicated mechanisms and always necessitates the filling operation to be interrupted.

In packing endless groups or bands of threads of textile materials in containers a problem is encountered of preventing these endless groups of threads from becoming tangled when being packed and delivered into containers. Presently known devices used for packing particulate materials in containers cannot be adapted to packing strands of textile materials since such devices do not provide for entanglement problems. As a matter of fact such devices with their continuous jarring operations would cause serious entanglement problems if applied to packing strands of materials in containers.

SUMMARY OF THE INVENTION

An object of the present invention is to avoid the prior art disadvantages in filling containers with continuous strands of materials.

Another object of the present invention is to provide an improved process and apparatus for filling band or sheet materials or loose materials of any kind into cartons or other containers in such a manner that the mate-

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rials will be tightly and uniformly packed or compressed in each container during the filling operations without requiring any interruption in the filling process.

A further object of the present invention is to provide an improved process and apparatus for filling containers with continuous strands of materials, for example textile materials, wherein said threads are prevented from becoming tangled when being packed and delivered into said containers.

Other objects and further scope of applicability of the present invention will become apparent from the detailed description given hereinafter; it should be understood, however, that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

Pursuant to the present invention, it has been found that the above-mentioned disadvantage may be eliminated and a much improved process and apparatus for packing continuous strands of materials, for example textile materials, into containers without causing said strands to become tangled has been developed wherein an apparatus is provided so as to lift and lower the container repeatedly while it is being filled and in such a manner as to jolt the material in the container and thereby pack it tightly together and fill the container uniformly without interruption.

In order to prevent the individual threads from becoming tangled, the present invention now discloses for the first time a means for placing textile strands or groups of threads into a container in an orderly manner while the material thus being deposited is simultaneously and automatically concentrated by the utilization of lifting and lowering movements during the filling operation. The lifting and lowering movements applied to the container during the filling operation according to the present invention render it possible to accommodate, without the danger of the strands becoming twisted, approximately double the amount of material in the containers when compared to prior art methods and devices.

According to the present invention it has been found that the most uniform and effective compression may be obtained by slowly lifting the container while it is being filled, then lowering it rapidly, and suddenly interrupting this rapid downward motion. However, a very effective rate of compression may also be attained by exerting an impact upon the container bottom at the beginning of the lifting movement as well as at the end of the lowering movement.

The apparatus according to the present invention comprises a support upon which the open container is placed and a suitable means for repeatedly lifting and lowering the support with the container thereon in a particular manner. The lifting and lowering process consists of first lifting the support preferably at a low speed, then lowering it rapidly and suddenly stopping this movement so that the container on the support will be given a strong jolt and the loosely packed material will thereby be uniformly compressed in the container.

According to a preferred embodiment of the present invention, the apparatus comprises a conveying element, for example a train of rollers on which the containers are moved to the filling position directly underneath the filling apparatus. In this position of the roller train, several of its rollers are separated from each by tappets or the like which may be slowly and rapidly lowered by a suitable mechanism which is located underneath the rollers of the roller train.

However, the apparatus according to the present invention may also be designed so that the roller train itself

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or at least those rollers on which the container rests in the filling position can be slowly lifted, rapidly lowered and suddenly stopped at the end of the lowering movement and before the next lifting movement so that at each stop an impact is exerted upon the material which has already filled into the container. The material is thus uniformly compressed.

If the material to be packed into the container consists of a flexible sheet material which is to be deposited therein in a zig-zag formation of successive layers, it is also possible according to the present invention to suspend the container to permit it to swing back and forth a predetermined distance equal to the length of each layer. The material may then be fed in a straight direction into the container and does not require a special folding device since the successive layers or folds are formed by the swinging movements of the container. A good rate of compression of the material may then be obtained while it is being filled into the containers by slowly lifting and rapidly lowering the suspension means to which the container is connected or on which it is disposed. Of course, these lifting and lowering movements must be carried out in a properly timed relation to the swinging movements of the container which produce the successive folds of the material.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood from the detailed description given hereinafter and the accompanying drawings which are given by way of illustration only and thus are not limitative of the present invention wherein;

FIGURE 1 illustrates the container filling apparatus of the present invention together with a conveying means using a pneumatic or hydraulic lifting device;

FIGURE 2 shows a lifting device wherein the up and down movement is produced by an eccentric; and

FIGURE 3 shows the eccentric used in lifting and lowering the container or conveying means as viewed along line A—A in FIGURE 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings wherein like reference numerals are used throughout the various views to designate like parts, the apparatus of the present invention comprises a frame 1 which is mounted on the floor 2 and supports a train of rollers 3 along which a container 4, which is to be filled is conveyed. An endless group of threads or sheet material 5 is supplied through feed rollers 6 and a pivotably suspended funnel 7. Underneath these feed rollers 6 the flexible material 5 is moved back and forth in the direction of the double arrow 8 by a lever which is pivotable in the direction of the arrow 9, so that the material is deposited in a zig-zag manner in the container 4. The central rollers of the roller train 3 are separated by triangular bearing blocks 10 which are connected to tappets 11 and a lifting and lowering mechanism 12 which may, for example, be operated pneumatically for lifting and lowering the container 4 while being filled with the band or sheet material 5. However, this movement may also be produced hydraulically, or by a cam or eccentric, or by a reciprocating rod or the like.

This mechanism 12 is preferably designed so that the tappets 11 and bearing blocks 10 are lifted slowly and lowered very rapidly. The container 4 with its contents, that is, with the band or sheet material 5 which has already been deposited therein, drops with an impact upon the roller train 3 which is stopped during the filling operation. The deposited material 5 is thereby uniformly compressed within the container 4.

If the lifting and lowering movements of the tappets 11 are produced by an eccentric or crank drive, only one half the distance of the movement of the tappets should be located underneath the supporting surface of the rollers. The tappets then hit their maximum lifting speed against

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the bottom of the container and then drop the container with a maximum lowering speed upon the upper surface of the rollers 3. The eccentric-driven mechanism has the advantage that the material which is deposited in a container will be punched and thus compressed twice during each cycle of movements, that is, once at the beginning of the lifting movement of the container when it is lifted off the rollers 3 and once when it is set down with a jolt upon the rollers at the end of the lowering movement of the container.

FIGURE 2 shows the apparatus of the present invention using an eccentric driven mechanism referred to above. The eccentric 13 is driven by a motor 14 either directly or by way of a gear 15. The eccentric, due to its sliding cam shape, effects, when rotating in the direction indicated by the arrow, a slow lifting of the container up to the point of greatest curvature of the eccentric (cam). Upon further rotation of the eccentric, the pin 16 again falls to the starting point. The action of the eccentric achieves a slow lifting motion and a rapid lowering motion of the container, thereby compacting the contents. During the gradual upward movement substantially no compaction of the material in the container is achieved. During the transition of the pin across the highest point on the eccentric, the box as well as its contents are subjected to the normal acceleration due to gravity. At this point no compaction has been produced. Only when the pin crosses the point of the eccentric cam having the smallest radius is the material stacked in the container compacted by the jolt produced as the pin falls again to the starting point due to the inherent inertia of the material in the container.

Instead of providing separate tappets for lifting and lowering the container, it is also possible to lift and lower either the entire roller train or a certain number of rollers on which the container is disposed during the filling operation. The rollers are then preferably lifted slowly and lowered rapidly, and the downward movement is terminated abruptly with a jolt so that an impact is exerted upon the container and the material which is folded or loosely deposited therein, thereby uniformly compressing said material.

In FIGURE 2 the triangular bearing blocks 10 are securely attached to a table 17 which is supported by tappets 11. If it is desired to lift and lower the roller train as discussed above, the bearing blocks 10 can be removed and the table 17 can be used to support the roller train.

The apparatus according to the present invention may be employed not only for tamping-down and compressing band or sheet materials, but also any other loose materials which are being filled into a container.

The invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications are intended to be included within the scope of the following claims.

It is claimed:

1. An apparatus for filling and packing material such as cables, sliver combings and other continuous groups of threads into a container which comprises a container means, means for introducing said materials into the container means in a zig-zag manner, said container means being disposed on a conveying means, lifting and lowering means disposed below the conveyor means and a plurality of tappet means freely interposed between said conveying means and connected to said lifting and lowering means, said tappet means directly and simultaneously communicating with the bottom of the container means during the filling operation, thus providing lifting and lowering movements for the container means during the filling operation.

2. The apparatus of claim 1, wherein the conveying means are rollers.

3. The apparatus of claim 1, wherein pneumatic means are used to raise and lower the container means.

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4. The apparatus of claim 1, wherein hydraulic means are used to raise and lower the container means.

5. The apparatus of claim 1, wherein eccentric means are used to raise and lower the container means.

6. The apparatus of claim 5, wherein the eccentric has a sliding cam shape thereby effecting a slow lifting of the container up to the point of greatest curvature of the eccentric and a rapid lowering of the container when this point is exceeded.

7. The apparatus of claim 1, wherein means are provided for lifting and lowering the conveying means and the container means disposed thereon.

8. The apparatus of claim 1, wherein feed rollers are provided for introducing the material into said container means.

9. The apparatus of claim 8, wherein funnel means are disposed between the feed rollers and the container means for further facilitating introduction of the material to said container means.

10. The apparatus of claim 9, wherein the lever means are connected at one end to said funnel means and pivotably connected at its other end to deposit the material into the container means in a zig-zag manner.

11. An apparatus for filling and packing material such as cables, sliver combings and other continuous groups of threads into a container which comprises a container means, means for introducing said materials into the container means in a zig-zag manner, said container

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means being disposed on a conveying means lifting and lowering means disposed below the conveying means and table means supported by a plurality of tappet means and disposed below a portion of the conveying means, said tappet means communicating with said lifting and lowering means and said table means directly communicating with the conveying means during the filling operation, thus providing a means for lifting and lowering the conveying means and the container means disposed thereon.

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U.S. Cl. X.R.

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