

FLEXIBLE CONTAINER FOR BULK MATERIAL

The present invention relates to a container for bulk material formed from a flexible material. Such containers are used for the lifting, transport and storage of bulk material, and comprise integrated lifting loops, at least one filling opening, sidewalls and a bottom.

Several different types of containers are known for transport and storage of bulk material. Containers having integrated lifting loops are described in our Norwegian Patent Nos: 136.744 and 138.134. These containers can be made with two lifting loops. Each loop has a width corresponding to half of the container's circumference. The first Patent describes a container having a single layer bottom. The latter Patent is primarily related to a bottom construction formed by joining in pairs equally wide bottom flaps which are direct extensions of the container's walls. In this way there can be formed a substantially square double bottom of two crossing bottom loops.

There also exist several types of flexible containers having lifting loops which are sewn on to the container. European Patent Application No: 1696 relates to such a container having four lifting loops fastened to each corner of a substantially square container, with a filling opening about the same area as the container's bottom. The lifting loops are made from narrow strips folded to form loops having two parts going downward, and at least one of these parts has the

14

same length as the height of the container. Because the container has a large inlet opening, it may be equipped with a top covering or lid having a smaller filling opening. This lid is sewn to the container's sidewalls all the way around its circumference. However, this container does not have the advantages resulting from the use of integrated lifting loops and a double bottom. Containers according to the previously mentioned Norwegian Patents have proved themselves to be well suited for transport and storage of free-flowing bulk material and they are used for several different purposes. An essential reason for this success has been the simple construction comprising integrated lifting loops. However, these containers also have their limitations, especially during loading into large containers or railroad cars. Further, their construction is not quite ideal for filling large articles like 50 kilo bags for further transport and storage in the flexible containers.

One aim of the present invention is to develop a flexible container having lifting loops which make it possible to lift or hang the container on to several holding devices or points in order to obtain a container which could be loaded easily into railroad cars, trucks or the like. Another aim is to provide a container suitable for the transport of large articles. Such flexible containers should during the filling operation possess a large inlet opening in order to make it applicable for other types of goods than free-flowing bulk material.

To the above ends, the present invention provides a container for bulk material formed from a flexible material, the container having an inlet opening and four integrated lifting loops, the lifting loops comprising direct extensions
5 from the container sidewall, and a bottom coupled to at least a portion of the sidewall at the base of the container. Preferably, each lifting loop comprises direct extensions from contiguous sidewall portions.

In a manner similar to the construction of the containers
10 described in the abovementioned Norwegian Patents, a container according to the invention can be made using two pieces of material, each folded together. By slitting up such a piece of material along about half its length and then folding the two narrow parts, half a container with two loops is formed.
15 By coupling two pieces of material a container can be made having four integrated lifting loops, one in each corner of the container. Where the material of the container is a woven fabric, the threads thereof can be aligned such that all the strength in the longitudinally running threads of
20 the container's material is utilized during the lifting operation.

The invention also facilitates the creation of short lifting loops enabling the container to be easily loaded into partially closed cars or wagons. One could for instance put
25 two lifting loops on each of the lifting forks of a truck. During the filling operation the container could be hanging in each of its four loops, so that the inlet opening approximately corresponded to the container's circumference.

Hanging up the container in such a way can be an advantage during filling of large articles such as small bags and also during filling of free-flowing bulk material. However, in the latter case it is usual to apply an inner bag of imperme-
5. vious material.

The container can be made in several ways. One is that referred to above in which the container is formed from two pieces of flexible material, each having a width substantially equal to one quarter of the container circumference and
10 being slit along half its length to define a major portion and two minor portions, wherein each piece is folded along a lateral fold line and lengths of the original longitudinal edges of the piece intermediate the fold line and the piece ends are secured together, the slit extending beyond the fold
15 line to define two lifting loops in the piece between its major portion and the respective minor portions, and wherein an equivalent length of each free longitudinal edge of the minor portions is secured to a complementary minor portion of the other piece to complete the container sidewall.

20 In most containers according to the invention, the container bottom comprises a direct extension of at least a portion of the sidewall at the base thereof. A multiple, double or single layer bottom may be formed in this manner, depending on the length of the material extending at the base from
25 the sidewall portions. In one preferred embodiment, a plurality of sidewall portions extend at the base of the container to form a double layer bottom therefor.

In an alternative way, the container is formed from four pieces of material each having a width substantially equal to one eighth of the container circumference, wherein each piece is folded along a lateral fold line and an edge thereof secured to itself intermediate the fold line and the piece ends to form a lifting loop, and wherein equivalent lengths of the other edge are secured to complementary edges of two other pieces to complete the container sidewall.

Two embodiments of the invention will now be described by way of example and with reference to the accompanying drawings wherein:-

Figure 1 shows one of two substantially similar pieces of material for joining to make a container as shown in Figure 3;

Figure 2 shows one of four substantially similar pieces of material for joining to make a container similar to that shown in Figure 3; and

Figure 3 illustrates a flexible container with four lifting loops, as may be made using pieces of material shown in Figure 1 or Figure 2.

The pieces of material shown in Figures 1 and 2 may of course be made from several pieces of material which are joined together, for instance two parts which are joined along the shown folding line. The pieces of material shown in Figures 1 and 2 can also be double ones, for instance parts

of a round-woven fabric which is then formed to a flat piece of material. In this case it is not necessary to use as dense a warp as in the case of a single layer fabric.

Figure 1 shows a piece of material 1A which corresponds to a piece of material 1B (not shown), and the container is made by joining together the pieces 1A and 1B. The piece of material 1A consists of a major portion 2, and minor portions 3 and 4 defined by the folding line 5 and the slit 8 which divides one half of 1A in two equally wide minor portions 3 and 4. The slit 8 runs down across the folding line 5, so that its extension forms the filling opening 6 shown on Figure 3. On both sides of the slit 8 there are joining lines 9 marked with dots up to the opening 6. The dotted lines 9 along the outer edges of the piece of material run from the opening 7 to the hatched bottom flaps with the dotted joining lines 10. In case the container shall be made with a single layer bottom, one of the pieces of material 1A or 1B can be made without the hatched bottom flap.

Figure 2 shows one out of four equally wide pieces of material 1 for making a container similar to that illustrated in Figure 3. Two of the dotted joining lines 9 run from the openings 6, 7 to the hatched bottom part, while the two opposing joining lines 9 run from the previously mentioned openings and all the way down to the joining line 10 at the bottom. Each piece of material 1 is folded around the line 5 and forms

a lifting loop having a width corresponding to 1/4 of the container's circumference. The four pieces of material are joined along the lines 9 and 10, thereby forming a container having a double layer bottom and four integrated lifting loops defined by the filling opening 6 and the loop openings 7 (Figure 3). In the case that two of the material pieces 1 are not having the hatched bottom part, there will be formed a container having a single layer bottom when the pieces of materials are joined together. The bottom of the container may also consist of a separate piece of material joined to the container's sidewalls.

Figure 3 illustrates a container that may be made from pieces of materials as shown in Figures 1 and 2. When the container is made from the pieces of material 1A and 1B, it will have six side seams. When it is made from four pieces of material 1, it will have eight side seams. In order to explain how the pieces of material 1A and 1B are joined together, the parts 2, 3 and 4 on Figure 1 are designated with reference to the pieces of material A and B. The two front sides shown will then consist of the parts 2A, 4A and 3B, as the pieces of material 1A and 1B are joined along the shown seam 9. The two sides at the back will then consist of 2B, 4B and 3A respectively, having the other joining seam between the pieces 1A and 1B. The reference numbers to the two sides at the back are shown with dotted arrows at the upper part of the container.

When the container is made ready for being placed in position for filling, or for further transport, it might be an advantage to fasten a tape of the like around each lifting loop. It will then be easier to put the lifting loops on to hooks or a fork device. Further it will then be simpler to put three or four lifting loops on to a hook. When the container is made ready for being lifted by the hook, it might be an advantage to fasten together all the four lifting loops.

The container according to the invention has made it possible to further extend the application of flexible containers having integrated lifting loops. Such containers can easily be filled both with free-flowing bulk material and large articles. A maximum utilization of the container's volume is obtained at the same time as it becomes possible to lift the container with devices which can be used during loading and unloading of partly closed wagons. The stress during lifting will be evenly distributed and the strength of the container's longitudinally running threads will be utilized at its maximum.



CLAIMS

1. A container for bulk material formed from a flexible material, the container having an inlet opening and four integrated lifting loops, the lifting loops comprising direct extensions from the container sidewall, and a bottom coupled
5 to at least a portion of the sidewall at the base of the container.
2. A container according to Claim 1 wherein each lifting loop comprises direct extensions from contiguous sidewall portions.
- 10 3. A container according to Claim 2 wherein the entirety of each loop and the sidewall portions of which it is an extension is formed from a single piece of flexible material.
4. A container according to Claim 2 or Claim 3 wherein the container is formed from two pieces of flexible material each
15 having a width substantially equal to one quarter of the container circumference and being slit along half its length to define a major portion and two minor portions, wherein each piece is folded along a lateral fold line and lengths of the original longitudinal edges of the piece intermediate the
20 fold line and the piece ends are secured together, the slit extending beyond the fold line to define two lifting loops in the piece between its major portion and the respective minor portions, and wherein an equivalent length of each free longitudinal edge of the minor portions is secured to a complementary minor portion of the other piece to complete the
25 container sidewall.

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5. A container according to Claim 2 or Claim 3 wherein the container is formed from four pieces of material each having a width substantially equal to one eighth of the container circumference, wherein each piece is folded along a lateral
5 fold line and an edge thereof secured to itself intermediate the fold line and the piece ends to form a lifting loop, and wherein equivalent lengths of the other edge are secured to complementary edges of two other pieces to complete the container sidewall.
- 10 6. A container according to any preceding Claim wherein the flexible material is a woven fabric, and wherein threads of the fabric are aligned in the vertical direction in each sidewall portion and around the lifting loops.
7. A container according to any preceding Claim wherein the
15 container bottom comprises a direct extension of at least a portion of the sidewall at the base thereof.
8. A container according to Claim 7 wherein a plurality of sidewall portions extend at the base of the container to form a double layer bottom therefor.
- 20 9. A container for bulk material substantially as described herein with reference to Figure 1 or Figure 2, and Figure 3 of the accompanying drawings.

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