

Folded box for transport of cylindrical articles

5 Description:

The invention relates to a folded box for transport of cylindrical articles, comprising two octagonal base planes which are arranged in parallel to each other. At least three rectangular main side planes, which are attached to three outer edges of each
10 octagonal base plane connect the base planes with each other.

For transport and shipment of cylindrical articles like tyres, wheels or rims it is often necessary to pack the articles in order to protect them against dirt and damage. Furthermore, shipping information has to be attached to the articles, which is often
15 done by sticking labels to the packaging and not to the article itself. Several tyres can be stacked onto a palette, for example, and the palette is wrapped with foil and is shipped to the desired destination. However, when single tyres are to be shipped in the automotive aftermarket, for example, they have to be packed individually. Usually, single tyres are packed by using a cling wrap. This is disadvantageous,
20 because such packaging adheres to conveyer belts causing blockages and delays within the distribution network. Therefore, cardboard packagings can be used.

German Utility Model No. DE 20 2007 002 377 U1 discloses a packaging made of cardboard for cylindrical articles like tyres which comprises a stripe with a plurality of
25 flaps on both sides. The cardboard stripe is wrapped around the tyre tread and its ends are connected. The flaps are folded on both sides in order to form a cylindrical packaging, whereby the flaps are connected to each other.

German Patent Application No. DE 38 39 694 A1 describes a folded box for articles
30 like light alloy rims which is made from cardboard. The folded box is made from a single pre-cut cardboard that comprises an octagonal base plane the size of a rim.

Several rectangular side parts are connected to the octagonal base which can be folded upwards for forming the frame of the box. Preferably, the side parts are folded twice in order to form a strong cardboard frame. One or more alloy rims can be placed in such folded box and several boxes are stacked onto each other. Then, the stack of boxes is wrapped by another cardboard material and the package is wound with stripes.

Furthermore, U.S. Patent No. 4,793,546 describes an eight-side box with the features of the preamble of independent claim 1 having uninterrupted top and bottom walls, which can be inexpensively manufactured as a single sheet of corrugated cardboard and shipped in a flattened, knock-down configuration. Preferably, the box comprises eight-sided top and bottom walls, rectangular-shaped wall panels joined to the top and bottom walls along opposite edges thereto, trapezoidally-shaped wings intermediate the points of attachment of the side walls to the top and bottom walls, locking tabs and complementary locking slots and glue flap on a top wall which can be secured to an inner surface of one of the box wall panels.

The objective of the invention is to provide a packaging for cylindrical articles like tyres, rims and wheels, which allows easy and secure transport of such articles. The packaging should be made from pre-cut cardboard that can easily be assembled.

According to the invention, this objective is achieved by a folded box having the features of the independent Claim 1. Advantageous refinements of the box are set forth in the subordinate Claims 2 through 8.

The folded box according to the invention comprises two octagonal base planes which are arranged in parallel to each other, whereby at least three rectangular main side planes, which are attached to three outer edges of each octagonal base plane, connect the base planes with each other. At least one hinged cover part is connected to another outer edge of one of said octagonal base planes. Four rectangular supplementary side planes are attached to the edges of two opposite rectangular main side planes, whereby said supplementary side planes are attached

to that edges of said opposite main side planes that are not connected to the octagonal base planes. Furthermore, eight reinforcing planes are attached to those outer edges of the octagonal base planes that are not connected to main side planes or the at least one hinged cover part, whereby the reinforcing planes are folded into the inside of the folded box and they are arranged underneath the supplementary side planes. According to the invention, the at least one hinged cover part and one of the main side planes comprise lateral locking tabs, whereby the reinforcing planes have a recess and a shape with a width that is about half the width of the supplementary side planes in order to allow the locking tabs to engage in slots in the supplementary side planes.

In one embodiment of the invention, a hinged cover part is connected to an outer edge of each octagonal base plane, respectively.

Preferably, the main side planes and the at least one hinged cover part are attached to every second outer edge of each base plane, whereby three adjacent outer edges of each base plane are not connected to a main side plane, and the at least one hinged cover plane is attached to the middle edge of these adjacent outer edges.

In a further embodiment of the invention, the folded box consists of one pre-cut cardboard that comprises two octagonal base planes that are connected at an outer edge of each base plane by a rectangular main side plane, whereby two further rectangular side parts and a hinged cover part are connected to three other outer edges of each base plane, respectively, whereby a further rectangular side part of a base plane is connected to a further rectangular side part of the opposite base plane thereby forming a first main side plane of the folded box, and a further rectangular side part of a base plane is connected to a further rectangular side part of the opposite base plane thereby forming a second main side plane of the folded box.

Preferably, the rectangular side part of the base plane is a glue flap which is glued to the rectangular side part of the base plane.

In another embodiment of the invention, the rectangular side part of the first base plane and the rectangular side part of the second base plane each comprise said lateral locking tabs which engage with slots in two of the supplementary side planes.

- 5 The cover parts of the first base plane and the cover part of the second base plane can also each comprise said lateral locking tabs which engage with slots in the other two supplementary side planes.

The advantage of the folded box according to the invention lies in the easy but
10 secure packaging of cylindrical articles like tyres. The packaging can be handled in every kind of transport or shipment process without damage to the packed article or the devices involved. Shipping labels with barcodes can easily be attached to the box and a tyre can be handled like any other parcel or small container.

15 Furthermore, the folded box can be used several times and can be folded and stacked after use. When the box is needed again, it can be reassembled in a very easy. The octagonal shape of the box avoids damage to corners of the box as it usually occurs when rectangular boxes are used for transport of cylindrical articles.

20 Additional advantages, special features and practical refinements of the invention can be gleaned from the subordinate claims and from the presentation below of preferred embodiments making reference to the figures.

The figures show the following:

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Figure 1 a side view of one embodiment of a folded box;

Figure 2 an embodiment of one of two identical pre-cut cardboards for assembly of
a folded box;

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Figure 3 an embodiment of a single pre-cut cardboard for assembly of a folded box;

Figure 4 an embodiment of a folded box according to the invention with locking tabs and reinforcing planes;

Figure 5 a side view of the folded box of figure 4; and

Figure 6 an embodiment with two inner boxes.

Figure 1 shows an embodiment of a folded box, whereby some details of the box do not correspond to the box according to the invention, but this Figure can serve for illustrating the basic features of the invention. The folded box 10 can receive a cylindrical article like a tyre, wheel or rim, for example. However, the invention is not limited to the packaging and shipment of automotive articles, because any cylindrical article can be transported with the box in a very safe and convenient way. The folded box is very easy to assemble and provides for safe transport of an article.

In the following, the folded box 10 will be described with the shipment of a tyre 20. Preferably, a single tyre 20 is brought into the folded box 10. If thinner articles are shipped, two articles can be placed in the box next to each other. Therefore, the folded box offers various possibilities for packaging of cylindrical articles.

The folded box 10 comprises two octagonal base planes 30 and 30' which are arranged in parallel to each other. The inner diameter of the octagonal base planes is about the size of the article to be transported. For transport of a tyre the inner diameter of the base planes is about 660mm, for example. Preferably, different folded boxes are designed for different articles or different sizes of articles, respectively. For example, folded boxes for the shipment of rims can be smaller than boxes for transport of tyres. On the other hand, the size of a folded box does have to be adjusted to every possible diameter and width of a tyre. If an article does not fill out the folded box, cushions can be inserted in the free space.

The folded box 10 further comprises three rectangular main side planes 50, 51 and 52, which are attached to three outer edges 40, 41, 42, 40', 41' and 42' of each

octagonal base plane, respectively. These main side planes connect the octagonal base planes 30 and 30' with each other. Furthermore, at least one hinged cover plane is connected to another outer edge of one of said octagonal base planes 30 and 30'. Thereby, a first cover part 60 can be connected to a first outer edge 43, and
 5 a second cover part 60' can be connected to a second outer edge 43'. When both cover parts are folded inwards, they form a cover plane that closes the remaining opening on one side of the folded box 10. These cover parts 60 and 60' can be glued together or can be connected by an adhesive tape, for example.

10 In another embodiment, only one cover plane is connected to one outer edge of a first base plane 30 and when the cover plane is folded inwards, it closes the remaining opening of the folded box 10. In this case, the cover plane can be connected to the opposite outer edge of the opposite base plane 30' by use of an adhesive tape, too. In order to facilitate the fixing, the cover plane can comprise one
 15 ore more tabs which are separated from the cover plane by a folded lines. The tabs can be folded inwards and can be connected to the opposite base plane 30', thereby providing a sufficient surface for a fixing. The cover plane or cover parts can also comprise one ore more locking tabs that can be inserted into slots in the opposite cover part or the opposite base plane, respectively.

20 In one embodiment, the main side planes 50, 51 and 52 are attached to every second outer edge of each base plane 30 and 30', whereby three adjacent outer edges of each base plane are not connected to a main side plane. In that case, the at least one hinged cover plane is attached to the middle edge of these remaining
 25 adjacent outer edges. Thereby, the main side planes and a cover plane are connected to every second outer edge of the base plane 30 and 30'. Preferably, the width of the main side planes 50, 51 and 52 corresponds to the width of the article to be transported. In case of a tyre 20, the width lies between 10-40cm, for example. In a preferred embodiment, the width of the main side planes is about 240mm. The
 30 main side planes 50, 51 and 52 can be arranged at the outer edges of the octagonal base planes in various manners, but the configuration according to figure 1 provides for a very stiff and strong box. If the main side planes and the cover plane (parts) are

arranged at every second outer edge of the octagonal base planes, as shown in figure 1, no further side planes have to be provided for transport of small and light articles, for example.

5 However, when tyres are transported further side planes should be provided in order to increase the stability of the folded box. For that purpose, four rectangular supplementary side planes 70, 71, 72 and 73 can be attached to the edges of two opposite rectangular main side planes 50 and 52, whereby said supplementary side planes are attached to that edges of said opposite main side planes 50 and 52 that
10 are not connected to the octagonal base planes 30 and 30'. These supplementary side planes 70, 71, 72 and 73 cover the remaining openings of the folded box. The supplementary side planes are separated from the main side planes 50 and 52 by folded lines and can thus be folded in order to form an outer surface for the folded box which then has an octagonal profile. Preferably, fixing stripes 300, 301, 302 and
15 303 provided with a folded line are located opposite to the fold of each main side plane, as can be gleaned from figure 2. The fixing stripes 300, 301, 302 and 303 can also be folded inwards and can be connected to the adjacent main side plane 51, which is formed by two main side parts by use of glue and/or an adhesive tape, for example. They can be connected by a fixing comprising tabs and slots, too.

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In order to give the folded box 10 even more stability and to close gaps between the side planes and the base planes eight fan-shaped connecting planes 80, 81, 82, 83, 80', 81', 82' and 83' can be arranged between the supplementary side planes 70, 71, 72, 73 and those outer edges of the octagonal base planes 30 and 30' that are not
25 connected to the main side planes 50, 51 and 52 and the hinged cover parts 60 and 60'. This arrangement can be gleaned from figure 2, but is not part of the invention. Preferably, each fan-shaped connecting plane comprises at least two triangular fan planes 84 and 85, which are separated by a crease line 90. When the box 10 is assembled each fan-shaped connecting plane is folded into the inside of the folded
30 box 10 at its crease line 90. A circular relief hole 91 is located at the sharp end of each fan-shaped connecting plane 80, 81, 82, 83, 80', 81', 82' and 83' for easier folding of the components of the box 10.

The folded box 10 can be assembled in different ways. In a first embodiment, the folded box consists of two identical pre-cut cardboards that are connected to each other. Such pre-cut cardboard is shown in figure 2, whereby a single pre-cut
 5 cardboard will be described with respect to figure 2. Two pre-cut cardboards form a box and thereby, main side planes 50, 51 and 52 and supplementary side planes 70, 71, 72 and 73 of the final box are divided into two opposite parts arranged at each pre-cut cardboard, whereby two opposite main side parts of each pre-cut cardboard form the main side planes 50, 51 and 52 of the folded box, for example. Two
 10 supplementary side parts form the supplementary side planes 70, 71, 72 and 73, respectively. Preferably, the direction of fluting in the cardboard material of the folded box is chosen as shown in figure 2.

Each pre-cut cardboard comprises an octagonal base plane 30 and three rectangular
 15 main side parts 100, 101 and 102, which are attached to three outer edges 40, 41 and 42 of the octagonal base plane 30. A hinged cover part 60 is connected to another outer edge 43 of the octagonal base plane 30. The main side parts and the hinged cover part are arranged at every second outer edge of the base plane. Four rectangular supplementary side parts 200, 201, 202 and 203 are connected to each
 20 side of two opposite main side parts 100 and 102 via folds. Four fan-shaped connecting planes 80, 81, 82 and 83 are arranged between these supplementary side parts 200, 201, 202 and 203 and the base plane 30. The fan-shaped connecting planes are designed as described above for the folded box. They each comprise at least two triangular fan planes 84 and 85, a crease line 90 and a relief hole 91.

25 Preferably, fixing stripes 300, 301, 302 and 303 are located at the supplementary side parts 200, 201, 202 and 203. Fixing stripes 301 and 302 can be used for fixing the supplementary side parts 201 and 202 with the main side part 101, for example. This connection will be established when the folded box 10 is assembled. The fixing
 30 stripes 300 and 303 on the side of the cover part 60 can be fixed to the cover parts 60 and 60' of each pre-cut cardboard after the tyre 20 has been placed in the folded box.

Preferably, at least the main side parts 100 and 102, the supplementary side parts 200, 201, 202 and 203 and the fixing stripes 300, 301, 302 and 303 each comprise glue edges for connection with other components. Alternatively or in addition to an adhesive fixing, the parts can be stapled to each other. One of these glue edges is indicated with reference numeral 304 in figure 2. The two pre-cut cardboards can be connected to each other via these stripes that are glued onto each other. Preferably, there is no fold between the respective side part and a glue edge. When the main side parts 100 and 102, the supplementary side parts 200, 201, 202 and 203 and the fixing stripes 300, 301, 302 and 303 of one pre-cut cardboard have been glued to their corresponding parts of another pre-cut cardboard, these parts form the respective planes of the box. After connection of the two pre-cut cardboards, the box can be folded and erected.

The assembly of two pre-cut cardboards can be folded via a line running through the outer edge 42 of the base plane 30 of the first pre-cut cardboard and a line running through the outer edge 40' of the base plane 30' of the second pre-cut cardboard, for example. Thereby, a flat box kit can be provided. Several of these flat box kits can be bought by a customer who wishes to ship one or more tyres. The two pre-cut cardboards can be folded via the glued edges 304, too, if corresponding folds are provided. However, when the cardboards are folded at the glued edges, the outer surface of the folded box will tend to bend, which might be disadvantageous.

A person will unfold the box kit consisting of two identical pre-cut cardboards and will fix the fixing stripes 301 and 302 with the main side plane 101 of each cardboard. The cover parts 60 and 60', the supplementary side parts 200, 203, 200' and 203' and the fan-shaped connecting planes 80, 83, 80' and 83' are bent outwards in order to form a wide opening as can be gleaned from figure 1. The tyre 20 can be rolled into the folded box 10. Then, the named parts are bent inwards and the cover parts 60 and 60' and the fixing stripes 300 and 303 can be folded onto each other in order to form a complete cover for the box. The cover can be fixed by means of an adhesive tape, for example. In another embodiment of the invention, the cover parts

60 and 60', the supplementary side parts 200, 203, 200' and 203' and the fan-shaped connecting planes 80, 83, 80' and 83' comprise tabs and/or slots, respectively. The tabs are inserted into the slots and, additionally, the cover is fixed by means of an adhesive tape.

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In another embodiment, the folded box consists of one pre-cut cardboard which is shown in figure 3. The cardboard basically comprises similar parts as the single cardboards of figure 2. However, when two of these cardboards are combined, two main side parts 101 form the main side plane 51 of the final folded box. The supplementary side parts and the fan-shaped connecting parts and all glue edges correspond to the embodiment of figure 1. The cardboard can be cut from continuous cardboard material and then folds, crease lines and relief holes can be produced in any method known to a person skilled in the art. In addition to the folds and cuts required for two single pre-cut cardboards, in a single pre-cut cardboard a cut has to be provided between the fixing stripes 301 and 301' and 302 and 302', respectively. The different parts of the cardboard are connected to each other as described for the embodiment of figure 2.

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An embodiment of a folded box according to the invention is shown in figure 4, where dotted lines are crease or fold lines, whereas solid lines show cut lines. In this embodiment, two octagonal base planes 30 and 30' are connected by a main side plane 52 at outer edges 42 and 42'. Further main side parts 100 and 100' are connected to base planes 30 and 30' at outer edges opposite to edges 42 and 42'. When the box is folded, main side parts 100 and 100' form the main side plane 50. In the embodiment of figure 4, main side part 100' is a thin glue flap. In that case, main side part 100 will form the main side plane 50 and the main side part 100 is glued to the glue flap 100'. Four supplementary side planes 70, 71, 72 and 73 are attached to the main side parts/planes 52 and 100, respectively. Each supplementary plane comprises a slot 63, 64, 65 and 66 in its outer region, respectively. Two cover parts 60 and 60' and two side parts 101 and 101' comprise lateral locking tabs 61, 62, 61', 62', 67, 68, 67' and 68', respectively, which can be engaged with the slots of the supplementary planes when the box is folded. The locking tabs can have fold lines

for easy bending inwards. Thereby, the side parts 101 and 101' form the backmost side plane 51 of the folded box 10 when they are engaged with each other. The cover parts 60 and 60' can be engaged with the supplementary planes after the tyre has been placed in the folded box. With these locking tabs and slots no additional sticking tape is required.

The engagement of the locking tabs of the cover parts 60 and 60' with the slots 63 and 64 of the supplementary planes 70 and 73 is shown in figure 5. The backmost main side plain 51 was formed by connecting the side parts 101 and 101' in the same manner. When the cover parts and side parts are connected, an optional sticking tape can be applied or the whole folded box is tied with a band, for example. In figure 1, the box is closed by cover parts 60 and 60' which are folded over the remaining opening of the box from above and below. In contrast to the embodiment of figure 1, the box is now closed by cover parts 60 and 60' which are folded over the opening of the box from the left and right hand. The supplementary side planes 70 and 73 can be wide opened for rolling an article in the folded box, for example, and when the article is placed in the box, the supplementary side planes 70 and 73 can be folded inwards and the remaining opening is closed by connecting the cover parts 60 and 60' by inserting the locking tabs 61, 62, 61' and 62' into the slots 63 and 64 of the supplementary side planes.

Each octagonal base plane can comprise four reinforcing planes 92, 93, 94, 95 and 92', 93', 94' and 95, respectively. These reinforcing planes are connected to those outer edges of the base planes that are not connected to cover parts or side parts. Preferably, they are connected to every second edge of the base planes. In contrast to the embodiment shown in figure 2, the edges of the reinforcing planes are not connected to the supplementary planes 70, 71, 72 or 73, the cover parts 60 or 60' and the side parts 101 or 101'. Therefore, they can be folded into the inside of the box via fold lines and will be arranged underneath the supplementary planes when the box 10 is erected.

The reinforcing planes can have various shapes in order to fulfil their function of closing the gap between the supplementary planes and the cover parts 60 or 60' and side parts 101 or 101', respectively. Furthermore, they are supposed to reinforce the main side planes. When they are folded inwards they should not interfere with each other or the locking flaps of the cover parts 60 or 60' and side parts 101 or 101'. In the embodiment of figure 4, this is achieved by reinforcing planes with a width W that is about half the width of the supplementary planes. Thereby, the reinforcing planes can be arranged underneath the supplementary planes without overlapping each other. Furthermore, the reinforcing planes can have a round or rectangular recess 96 that allows the locking flaps to engage with the slots of the supplementary planes.

In the embodiment of figure 4, the folded box 10 consists of a single pre-cut cardboard. In an alternative embodiment which is not shown in the figures, this box with reinforcing planes 92, 93, 94, 95, 92', 93', 94' and 95 can also consist of two identical pre-cut cardboards which are connected at the main side parts and supplementary side parts, for example. Furthermore, these two pre-cut cardboards can comprise locking tabs and slots or adhesive tapes can be used for connecting the corresponding parts with each other. Locking tabs and slots can also be provided in the embodiments of figures 2 and 3. Therefore, any combination of features shown in the figures can be chosen for a folded box depending on the requirements for packaging a specific article.

Figure 6 shows another possible application of the folded box 10. Thereby, one or two smaller inner boxes 400 and 401 can be inserted into the interior space of a tyre 20. Additional parts and/or literature can be placed in these smaller boxes. The boxes can have any shape that fits into the interior space of the tyre 20. However, it has proven to be advantageous to use two identical boxes that form a hexagonal body when they are put together. Additional parts can be placed in the inner boxes and the inner boxes are brought into the interior space of the tyre. Then, the tyre is placed in the box 10 and the box is closed as described above.

Claims:

1. Folded box (10) for transport of cylindrical articles (20), comprising two octagonal base planes (30;30') which are arranged in parallel to each other, whereby at least three rectangular main side planes (50;51;52), which are attached to three outer edges (40;41;42;40';41';42') of each octagonal base plane (30;30'), connect the base planes (30;30') with each other, whereby at least one hinged cover part (60;60') is connected to another outer edge (43;43') of one of said octagonal base planes (30;30'), four rectangular supplementary side planes (70;71;72;73) are attached to the edges of two of the rectangular main side planes (50;52), whereby said supplementary side planes (70;71;72;73) are attached to that edges of said main side planes (50;52) that are not connected to the octagonal base planes (30;30') and eight reinforcing planes (92;93;94;95;92';93';94';95') are attached to those outer edges of the octagonal base planes (30;30') that are not connected to main side planes (50;51;52) or the at least one hinged cover part (60;60'), whereby the reinforcing planes (92;93;94;95;92';93';94';95') are folded into the inside of the folded box (10) and they are arranged underneath the supplementary side planes (70;71;72;73),
characterized in that,
the at least one hinged cover part (60;60') and one of the main side planes (51) comprise lateral locking tabs (61;62;61';62';67;68;67';68'), whereby the reinforcing planes (92;93;94;95;92';93';94';95') have a recess (96) and a shape with a width that is about half the width of the supplementary side planes (70;71;72;73) in order to allow the locking tabs (61;62;61';62';67;68;67';68') to engage in slots (63;64;65;66) in the supplementary side planes (70;71;72;73).
2. Folded box according to Claim 1,
characterized in that,

a hinged cover part (60;60') is connected to an outer edge (43;43') of each octagonal base plane (30;30'), respectively.

3. Folded box according to Claim 1 or 2,
characterized in that,
the main side planes (50;51;52) and the at least one hinged cover part (60;60') are attached to every second outer edge of each base plane (30;30'), whereby three adjacent outer edges of each base plane (30;30') are not connected to a main side plane (50;51;52), and the at least one hinged cover plane (60;60') is attached to the middle edge of these adjacent outer edges.
4. Folded box according to one of Claims 1 to 3,
characterized in that,
the material of the folded box (10) is cardboard.
5. Folded box according to one of Claims 1 to 4,
characterized in that,
it consists of one pre-cut cardboard that comprises two octagonal base planes (30;30') that are connected at an outer edge (42;42') of each base plane (30;30') by a rectangular main side plane (52), whereby two further rectangular side parts (100;100';101;101') and a hinged cover part (60;60') are connected to three other outer edges of each base plane (30;30'), respectively, whereby a further rectangular side part (100) of a base plane (30) is connected to a further rectangular side part (100') of the opposite base plane (30') thereby forming the main side plane (50) of the folded box, and a further rectangular side part (101) of a base plane (30) is connected to a further rectangular side part (101') of the opposite base plane (30') thereby forming the main side plane (51) of the folded box.
6. Folded box according to Claim 5,
characterized in that,
the rectangular side part (100') of the base plane (30') is a glue flap which is glued to the rectangular side part (100) of the base plane (30).

7. Folded box according to one of Claims 5 and 6,
characterized in that,
the rectangular side part (101) of the first base plane (30) and the rectangular side part (101') of the second base plane (30') each comprise said lateral locking tabs (67;68;67',68') which engage with slots (65;66) in two of the supplementary side planes (71;72).
8. Folded box according to Claim 7,
characterized in that,
the cover part (60) of the first base plane (30) and the cover part (60') of the second base plane (30') each comprise said lateral locking tabs (61;62;61';62') which engage with slots (63;64) in the other two supplementary side planes (70;73).