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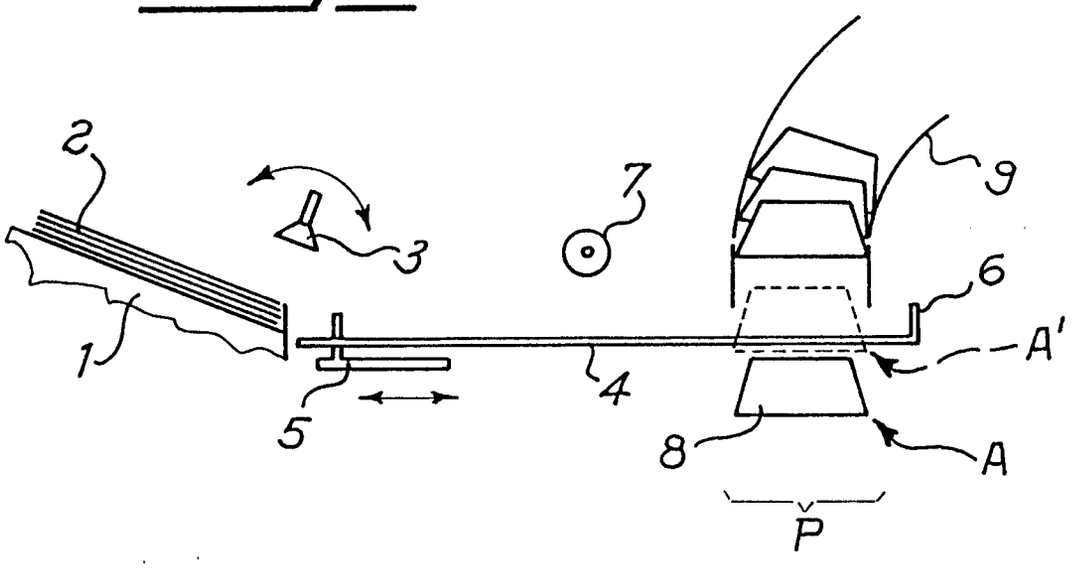
(54) An equipment and process for the production of open-top containers and related containers.

(57) An equipment for the production of open-tio containers made of paperboard or the like, starting from punched sheets, comprises means (5) to feed the sheets from a pile (2) to a bending position (A), along a track (4) and as far as a positioning retainer; means (7) to apply a bonding agent to the sheet during its feeding along the track (4); a mandrel (8) having slanting side surfaces, vertically movable to fold the sheet with the cooperation of pressing rollers (10) and bending rods (11), as well as driving and supporting means (9) to pile up and mutually inserting the containers formed on top of the mandrel. The invention further relates to a corresponding container forming process an to the open-top container having a top opening larger than the base thereof.

Fig.1



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The present invention concerns an equipment and a process for the production of open-top containers made of board, cardboard or similar sheetlike materials, as well as the related containers.

Different types of containers, specially for food, manufactured by using board, cardboard or similar sheetlike material have been known for a lone time. Said containers are generally obtained from a punched sheet with preset bending lines defining a base of the container and a plurality of limbs bent around said base line and partially superimposed and fastened to each other to form the walls of the container.

The methods used at present for the production or manufacture of the finished containers, starting from punched sheets, envisage a sequence of several stages subdivided into as many operating positions of the packaging machines, which therefore occupy relatively large areas and spaces.

For obvious reasons of space, the final user of this kind of containers prefers to keep in stock the punched sheets rather than the finished containers, which are formed according to the required use on the packaging site with the products (e.g. fruit and vegetables).

It is therefore evident how disadvantageous is the use of the known forming machines that, due to their overall dimensions, actually cancel the advantages obtained by storing the containers as flat punched sheets.

An object of the present invention is therefore to provide an equipment for forming containers starting from punched sheets, which has limited size and is at the same time functional and reliable.

Another object of the invention is to provide an equipment of the type and character referred to, wherein the formed containers are stackable in a superimposed and mutually inserted condition, in order to save the space occupied by the formed, empty containers.

A further object of the present invention is to provide a process for the manufacture of the aforesaid containers in a simple and economic way.

A still further object of the present invention is to provide a container which can be obtained in an easy and economic way from a puched sheet and is adapted to be stacked in a superimposed and mutually inserted condition with other equal empty containers.

Said objects are achieved thanks to the present invention that relates to an equipment for the production of containers made of paperlike material starting from punched sheets, characterized in that it comprises:

means to feed a punched sheet from a pile of said sheets to driving and positioning means;

means to drive said single sheet along said driving means up to a predetermined folding position;

means to apply a bonding agent to said punched sheet during its feeding alone said driving means;

a mandrel or similar forming means having one or more slanting side surfaces and movable in a substantially vertical direction in correspondence with said folding position; and

driving and pressing means to fold said sheet on said mandrel and to bond sheet parts together to obtain a container having a base, side walls and a top opening larger than said base.

The invention moreover concerns a process for the production of containers starting from punched sheets, characterized by the fact of comprising the steps of: feeding a punched sheet from a pile of said sheets to driving means;

feeding said sheet along said driving means, simultaneously applying a bonding agent to a plurality of areas of said sheet, until it is brought to a predetermined folding position; and forming an open-top container by way of translation of a mandrel or similar bending means, cooperating with driving rods and pressing rollers, said container having a top opening larger than the base thereof.

A further object of the present invention is also constituted by the finished containers obtained according to the invention and, more in particular, by an open-top container made of paperlike material, of the type consisting of a punched sheet with a substantially quadrilateral profile comprising bending lines which define a polygonal base and a plurality of limbs to be folded and fastened to each other, characterized in that from each apex of said polygonal base start four bending lines defining the limbs to be folded, two of said limbs contiguous to each other being fixable in a position superimposed to the side adjacent thereto of said container, and in that the limb immediately adjacent to said side presents a notch to position said contiguous limb in direct contact with said side when the container is formed.

The invention will be now further described with reference to the accompanying drawings, given for illustrative and not limiting purposes and wherein:

- figure 1 is a schematic side view of an equipment according to the invention outlining the process steps;
- figure 2 is an enlarged perspective view of the folding unit of the equipment of figure 1;
- figure 3 is a plan view of a container in the form of a punched sheet; and
- figure 4 is a perspective view of the finished container of figure 3.

As schematically shown in fig. 1, the equipment according to the invention comprises supporting means 1 of a pile of sheets 2 made of board or similar punched material, previously produced in a known way and provided with a plurality of bending

lines. In correspondence with said pile of punched sheets means 3 are provided, preferably of the sucker type, to remove the upper sheet of said pile and feed it to driving means 4, generally consisting of a track, along which rake means 5 are moved to translate the sheet 2 along the track 4 up to a stopper 6 or similar means for positioning the sheet in correspondence with a preset bending position generally indicated by the reference P.

Along the track 4 there are also provided means 7 to apply in a way known to the technique a bonding agent to the sheet 2 during its feeding along said track.

As better illustrated in fig. 2, means to bend and form the sheet 2 are provided in correspondence with said bending position P and comprise a mandrel or similar forming means 8, which is of truncated-pyramidal shape and movable in a substantially vertical direction from a non operative starting position A, underneath the sheet 2, to a second sheet-forming position, as indicated in fig. 1 by dashed lines A'.

Above the bending position A', in correspondence to the position reached by the bent and formed container, there are provided supporting and driving means 9 capable of supporting the formed containers over said mandrel to progressively mutually insert and pile up said containers as they arrive to the means 9, thus making easier their subsequent removal. In the preferred embodiment as shown, said means 9 are constituted by a couple of elongated members sidewardly bent. The containers are of the open-top type and are formed in a upside-down condition. Thanks to the form of the sheets 2 and of the mandrel 8, the finished containers will take a shape in which their top opening is larger than their base (see fig. 4), allowing a mutual insertion in their superimposed condition within the driving means 9.

Referring now to fig 2, the mandrel 8 cooperates in folding the sheets 2 with at least two pressing rollers 10 and with a number of driving rods 11, positioned in predetermined points with respect to said mandrel.

As it can be noticed, the rollers 10 are positioned on opposite sides with respect to the mandrel and are elastically stressed thereon by means of a couple of springs 12 (only one of them visible in fig. 2), which in the preferred configuration of fig. 2 connect to each other the ends of the axes 13 on which said rollers 10 are freely mounted. Said ends are movable inside slots 14 provided in driving and supporting plates 15.

As previously mentioned, the mandrel 8 cooperates also with a plurality of driving rods 11 positioned in correspondence with the bending lines of the punched sheet and having operating legs housed in corresponding grooves 16 provided in the side surfaces of the mandrel as engageable by the rollers 10. The position of rods 11, the shape of mandrel 8 and of its grooves 16 are obviously interchangeable according to the shape of the container to be formed.

During the operation of the equipment according to the invention, first of all the means 3 feed a sheet 2 from the pile present on the support 1 to the track 4, then the sheet is fed along said track by means of the rake 5 up to the stopper 6 in correspondence with a preset folding position P. During said feeding the means 7 deliver on the sheet 2 the required amount of bonding agent in predetermined positions.

Once the sheet 2 has been positioned by the stopper 6 on the mandrel 8, the latter is vertically moved, engaging the sheet 2 in its inner side, while the rods 11 and pressing rollers 10 operate on the sheet outer side, ccoperating in bending it and fastening its limbs to each other.

The formed sheet coming out on top of the bending position P is then engaged by the driving and supporting means 9 which allow its progressive movement upwards and sideways together with the other containers that have been or will be formed, thus creating a pile of mutually inserted containers easily removable by the operator.

Fig. 3 shows a punched sheet adapted to obtain a container particularly suitable for being formed by means of the equipment according to the invention.

Said sheet comprises a plurality of bending lines that define a base of the container as well as a plurality of limbs to be folded starting from said lines and at least partly superimposable and fixable to each other to form the finished open-top container as shown in fig. 4 with a top opening larger than its base.

In particular, from each apex 19 of the polygonal base 18 four of said bending lines 18', 18'', 18a, 18b, are provided defining two limbs 20 and 21 which are superimposed in sequence to the side 22 of the container once it is formed in a way that the limb 21 finds itself between the side 22 and the limb 20. In order to allow the limb 20 as well to be fastened, applying the bonding agent on one side only of the sheet to be bent and formed, the limb 21 is provided with a notch 23 allowing the direct contact between the side 22 and the limb 20 in the formed container, as shown in fig. 4.

Preferably, the bending lines 18a and 18b defining the limb 21 extend from the apex 19 only as far as the base 24 of the notch 23 or, as shown in fig. 3, only as far as a punched extension 25 of the base 24. Furthermore, the notch 23 has preferably a dovetail shape, enlarging from the edge towards the polygonal base 18. In this way it is possible to obtain much more extended areas 26 for glue

application than in the traditional containers, an advantageous feature of the container according to the invention.

Claims

1. An equipment for the production of containers made of paperlike material starting from punched sheets (2), characterized in that it comprises:
means (3) to feed a punched sheet from a pile of said sheets to driving and positioning means (4);
means (5) for feeding said single sheet along said driving means (7) up to a predetermined folding position (A);
means (7) to apply a bonding agent to said punched sheet during its feeding along said driving means (4);
a mandrel or similar forming means (8) having one or more slanting side surfaces and movable in a substantially vertical direction in correspondence with said folding position; and
driving and pressing means (10,11) to fold said sheet on said mandrel and to bond sheet parts together, to obtain a container having a base, side walls and a top opening larger than said base.

2. An equipment according to claim 1, characterized in that it further comprises supporting and driving means (9) extending on top of said folding position to support and pile up the formed containers in a mutually inserted condition.

3. An equipment according to claim 1 or 2, characterized in that said means to bend the sheet on said mandrel comprise a number of driving rods (11) and pressing rollers (10), said rollers being elastically stressed against said movable mandrel (8).

4. An equipment according to claim 1 or 2, characterized in that said driving and positioning means are respectively constituted by a track (4) and a stopper (6) positioned in correspondence with said folding position.

5. An equipment according to claim 4, characterized in that said sheet feeding means consist of a rake (5) moving along said track (4).

6. A process for the production of containers starting from punched sheets, characterized in that it comprises the steps of:
feeding a punched sheet from a pile (2) of said sheets to driving means (4,5);
feeding said sheet along said driving means (4,5) simultaneously applying a bonding agent to a series of areas of said sheet, until it is brought to a predetermined bending position (A);
and forming an open-top container by translation of a mandrel or similar bending means, cooperating with driving rods (11) and pressing rollers (10), said container having a top opening larger than the base thereof.

7. A process according to claim 6, characterized in that it also comprises the step of piling up the formed containers in a mutually inserted condition, directly at the outlet of said bending position, by means of driving and supporting means (9) for said containers.

8. An open-top container made of paperlike material, of the type consisting of a punched sheet with a substantially quadrilateral profile comprising folding lines which define a polygonal base (18) and a plurality of limbs to be folded and fastened to each other, characterized in that from each apex of said polygonal base (18) start four bending lines (18', 18'', 18a, 18b) defining folding limbs, two of the limbs (20, 21) contiguous to each other being fixable in a superimposed condition to the adjacent side (22) of said container, and in that the limb (21) immediately adjacent to said side presents a notch (23) to place said contiguous limb (20) in direct contact with said side (22) when the container is formed.

9. A container according to claim 8, characterized in that the bending lines (18a, 18b) defining said limb provided with said notch (23) extend from said apex up to the base of said notch and/or up to a punched extension of said base.

10. A container according to claim 9, characterized in that said notch (23) has a dovetail shape.

11. A container made of paperlike material as obtainable by means of a process according to claim 6 or 7.

Fig.1

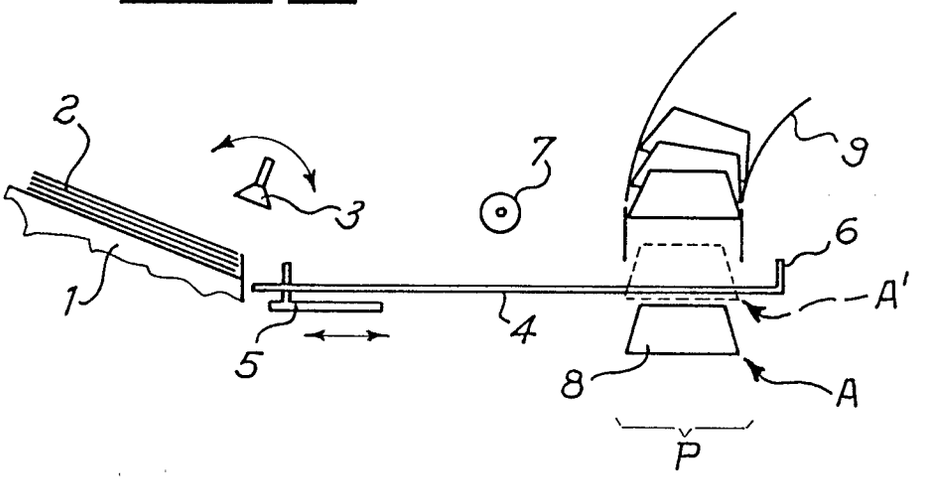
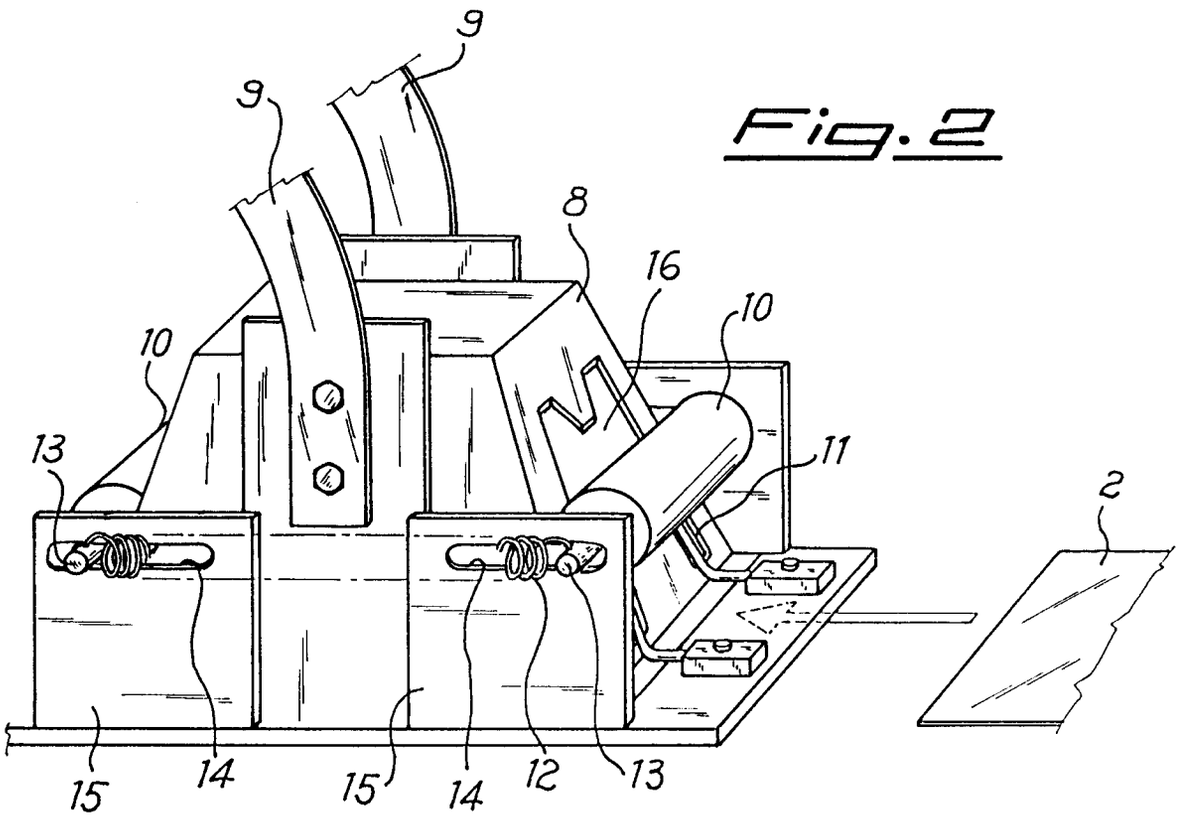
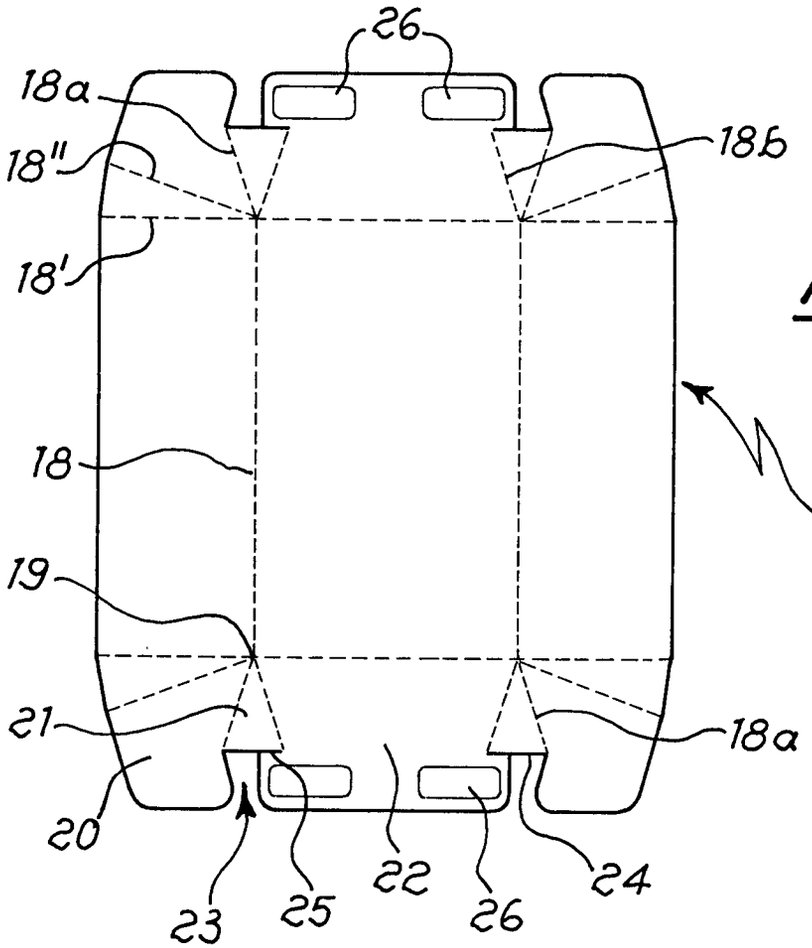


Fig.2

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18a
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18b
18'
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18a
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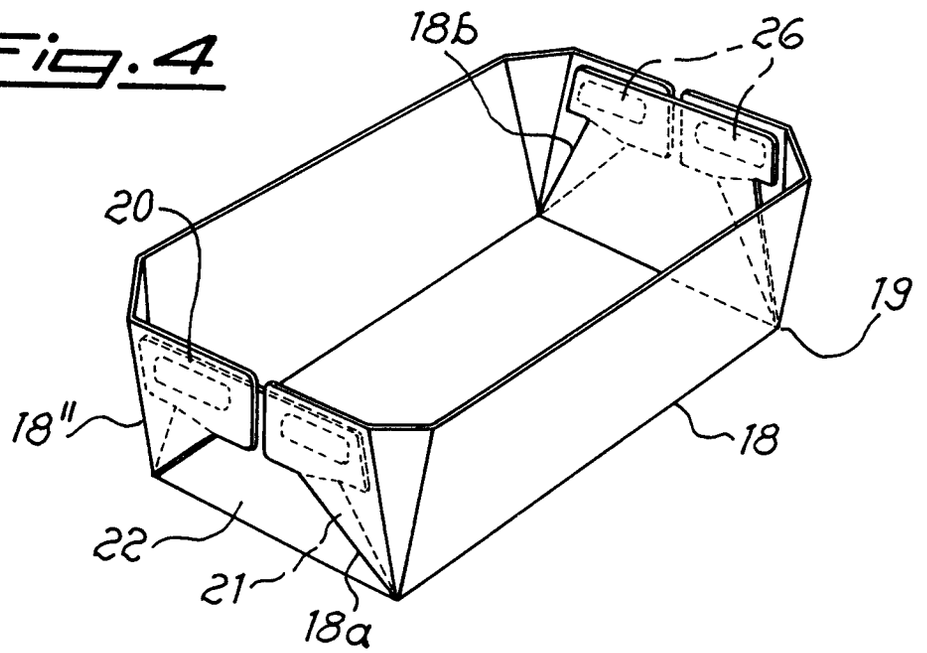
Fig.3

Fig.4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