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(11) **EP 1 375 162 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
02.01.2004 Bulletin 2004/01

(51) Int Cl.7: **B41J 2/175**

(21) Application number: **03076946.7**

(22) Date of filing: **24.06.2003**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT RO SE SI SK TR
Designated Extension States:
AL LT LV MK

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(30) Priority: **28.06.2002 EP 02078188**

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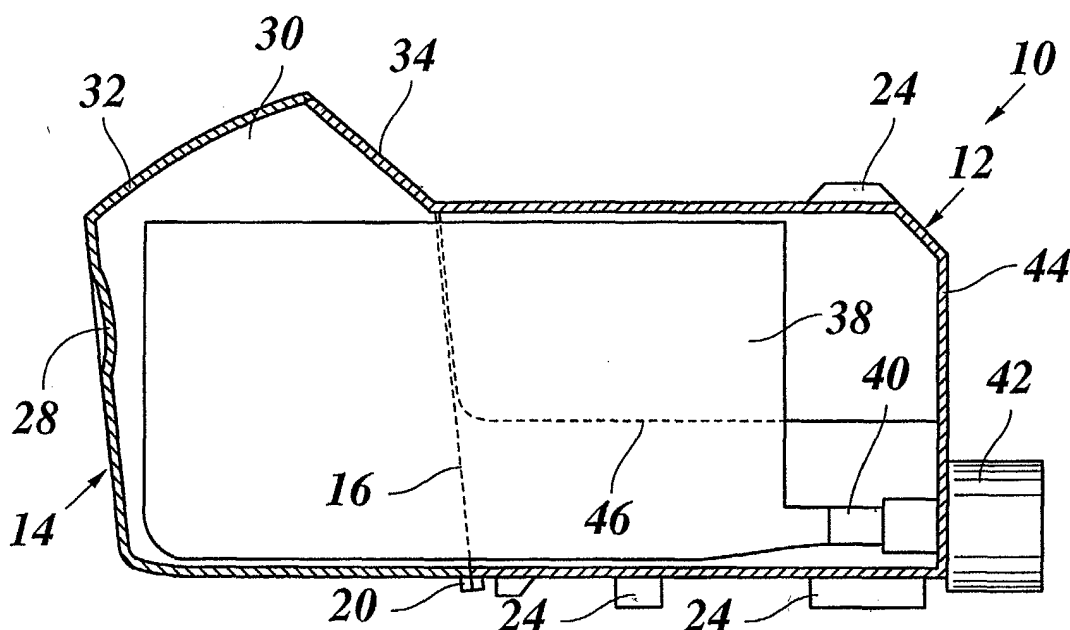
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(54) **Ink tank for ink jet**

(57) Ink tank comprising a casing (10) having a front wall (44) formed with a coupling (42), and a bag (38) accommodated in said casing (10) and connected to

said coupling (42), characterized in that the casing (10) comprises a first shell (12) including said front wall (44), and a second shell (14) welded to the first shell (12).

Fig. 2



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Description

[0001] The invention relates to an ink tank comprising a casing having a front wall formed with a coupling, and a bag accommodated in said casing and connected to said coupling.

[0002] Several ink jet printers comprise an ink tank that has a comparatively large volume and is arranged stationarily in the frame of the printer and is connected to a movable ink jet device through a flexible tube. In operation, ink supply to the ink jet device is achieved either by sucking ink out of the tank or by supplying air into the space inside of the casing but outside of the bag, so that the bag is collapsed and the ink is squeezed out. The supply of ink from the tank to the ink jet device may be assisted by gravitational forces. As an alternative, ink supply might be achieved through gravitational forces alone, provided that the casing can be vented. In any case, the bag prevents the ink from leaking out of the casing and/or from being dried out through contact with the air in the casing, whereas the casing prevents the bag from being damaged or squeezed and facilitates the handling of the ink tank. An example of an ink tank of this type is described in US-B-6,264,318.

[0003] It is an object of the invention to provide an ink tank according to the preamble of claim 1 that is easy to manufacture, and a method of manufacturing the same.

[0004] This object is achieved with the features indicated in the independent claims. The ink tank according to the invention comprises a first shell including said front wall, and a second shell welded to the first shell.

[0005] A method of manufacturing this ink tank comprises the steps of:

- molding a first and a second shell, the first shell having said front wall with the coupling formed therein, and an open end opposite to the front wall;
- connecting the bag to the coupling, such that a rear portion of the bag projects out of the open end of the first shell;
- fitting the second shell over the projecting portion of the bag; and
- welding the first and second shells together.

[0006] Since the first shell has an open end opposite to the front wall, it is possible to mold the coupling in the front wall, even when this coupling has a rather complicated structure, without causing any problems in withdrawing the molded shell from the mold. This greatly facilitates the manufacture of the casing formed with the coupling. Further, the bag may easily be connected to the coupling which is accessible through the open end of the first shell. Since the casing is completed and closed-off by welding the two shells together, with the second shell being fitted over the rear end of the bag, it is not necessary to provide any additional means for closing the casing.

[0007] The resulting ink tank has an integrated structure and cannot be re-opened, so that it is not possible to get access to the interior of the casing and to manipulate the bag. Since the two shells of the casing may be molded in almost any desired shape, it is possible to provide an ink tank which has an appellant design and satisfies the practical needs.

[0008] Useful details of the invention are indicated in the dependant claims.

[0009] When the two shells of the casing are connected by a continuous weld seam, it is possible to obtain an air-tight casing in which an elevated pressure can be generated for squeezing the ink out of the bag. In this case, a supply port for compressed air may preferably be molded in the second shell of the casing. On the other hand, when the ink is to be drained out of the bag by gravitational forces and, to this end, the casing has to be vented, the two shells may be welded together by spot-welding, so that minor gaps, which may serve as vent holes, remain at the seam between the two shells.

[0010] The bag is preferably accommodated in the casing in a U-shaped configuration, with both lateral portions of the bag being bent upwardly. In order to assist the bag in collapsing in the desired U-shape without forming undesired wrinkles, a wall-shaped collapsion induction fitment may be provided at the top wall of the first shell so as to depend into the interior of the casing. Then, when the bag is expanded, its top wall will fit around this fitment, so that the bag retains its U-configuration even in the expanded state, although it then almost fills the entire volume of the casing. When the bag collapses, it will reliably retain the U-shaped configuration which it had already in the expanded state.

[0011] Since the expansion and collapsion behaviour of the bag is controlled by the walls of the casing and, as the case may be, by the collapsion induction fitment, the bag may be filled and emptied multiple times without any need for getting access to the interior of the casing, once the bag has been accommodated in the casing.

[0012] Preferred embodiments of the invention will now be described in conjunction with the drawings, in which:

Fig. 1 is a perspective view of an ink tank according to the invention;

Fig. 2 is a longitudinal section through the casing of the ink tank; and

Fig. 3 is an exploded side elevation showing two shells forming a casing of the ink tank.

[0013] The ink tank shown in figure 1 has a box-like casing 10 made of synthetic resin. The casing comprises a first shell 12 and a second shell 14 which are both obtained through injection molding and are fitted together at a seam 16 which passes essentially vertically through the side walls 18 of the casing and bisects the casing approximately to two halves.

[0014] On the outer surfaces of the side walls 18, the

first and second shells 12, 14 are formed with mating flanges 20 which extend along the seam 16 and are engaging each other in the plane of the seam 16. These flanges 20 serve to improve the rigidity of the side walls 18 and each have two outwardly projecting ears 22 which are fixed to one another by spot-welding so as to integrate the two shells 12, 14 to an integral structure.

[0015] The first shell 12 has guide rails 24 projecting from its top and bottom surfaces. These guide rails 24 serve to guide the casing 10 when the same is inserted into a socket (not shown) of an ink jet printer in order to connect the ink tank to the ink supply system of the printer.

[0016] In the second shell 14, the rear wall 26 of the casing is provided with a lens-shaped depression 28. In order to disengage the casing 10 from the socket of the printer, the casing 10 must be pushed forwardly and upwardly. To this end, a user may engage his finger into the depression 28.

[0017] On the top side, the second shell 14 has roof-shaped portion 30 which is limited on the top side by an upwardly sloping wall 32 and a downwardly sloping wall 34. A shallow rectangular recess 36 in the upwardly sloping wall 32 is intended for accommodating a tag which may be used for example for indicating the type and colour of the ink contained in the tank.

[0018] As is shown in figure 2, the casing 10 accommodates a bag 38 made of flexible liquid-tight material and filled with ink. A spout 40 formed in the front lower edge of the bag 38 is connected to a coupling 42 which penetrates a front wall 44 of the first shell 12 and has been molded integrally with the first shell. Thus, when the ink tank has been inserted in the socket of the printer, the coupling 42 connects to the ink supply system of the printer, so that the ink may be withdrawn from the bag 38. This will cause the bag 38 to collapse, and since the seam 16 is not air-tight, the interior of the casing 10 is vented through minor gaps formed at the seam 16.

[0019] As is further shown in figure 2, the first shell 12 is formed with an internal wall 46 which depends from the top wall into the interior of the casing and is arranged in a longitudinal median plane of the casing. The wall 46 forms a fold in the bag 38, so that the lateral portions of the bag 38 are bent upwardly around the wall 46. When the ink is withdrawn from the bag, the bag collapses into a sheet-like configuration, and the wall 46 induces the collapse of the bag in such a manner that it will retain a U-shaped configuration with the lateral portions of the bag 38 being bent upwardly. When the bag 38 is refilled with ink through the coupling 42, the bag is expanded again so that it fills the interior of the casing 10 around the wall 46.

[0020] Coupling 42 comprises a valve mechanism that prevents leaking out of ink when bag 38 is filled with ink and enables the bag 38 to be refilled again with ink. The coupling only has one connection for ink and due to the construction of the ink tank and casing no extra coupling for in or outlet of air is needed. When during

the process of filling the bag 38 expands the air from the interior of the casing 10 is pressed out through the non-airtight seam 16.

[0021] As is shown in figure 3, the downwardly sloping wall 34 of the roof-shaped portion 30 is formed integrally with the first shell 12, so that the top leg of the seam 16 extends along the top corner between the walls 32 and 34. As a result, the second shell 14 has an open end facing towards the front side of the casing 10 without forming any undercuts, so that the second shell may readily be removed from the mold in the injection molding process. Similarly, the first shell 12 is flaring towards an open end opposite to the front wall 44. Thus, both shells 12, 14 can easily be formed by injection molding.

[0022] When the first and second shells 12, 14 have been molded, the bag 38 is inserted into the first shell 12 from the open rear end thereof and is connected to the coupling 42. Then, the second shell 14 is fitted over the projecting rear end of the bag 38, as is shown in figure 3. Finally, the shells 12, 14 are fixedly connected with one another by spot welding at the ears 22, e.g. by means of an ultrasonic welding tong.

Claims

1. Ink tank comprising a casing (10) having a front wall (44) formed with a coupling (42), and a bag (38) accommodated in said casing (10) and connected to said coupling (42), **characterized in that** the casing (10) comprises a first shell (12) including said front wall (44), and a second shell (14) welded to the first shell (12).
2. Ink tank according to claim 1, wherein the casing (10) has a box-like configuration and the first and second shells (12,14) are fitted together at a seam (16) which passes essentially through the center of side walls (18) of the casing in a plane essentially in parallel with the front wall (44).
3. Ink tank according to claim 2, wherein each of the first and second shells (12,14) has a flange (20) extending along said seam (16).
4. Ink tank according to claim 3, wherein the first and second shells (12,14) are spot-welded at the flanges (20).
5. Ink tank according to any of the preceding claims, wherein the second shell (14) has a roof-shaped top portion (30) delimited by an upwardly sloping wall (32) formed integrally with the second shell (14) and a downwardly sloping wall (34) which is formed integrally with the first shell (12) and projects from a rear end of a top wall thereof.
6. Ink tank according to any of the preceding claims,

wherein the first shell (12) has an internal wall (46) which projects downwardly from the top wall into the interior of the casing and is positioned in a longitudinal median plane of the casing.

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7. Ink tank according to any of the preceding claims, wherein the first and second shells (12, 14) are injection-molded parts.

8. Method of manufacturing an ink tank, which comprises a casing (10) having a front wall (44) formed with a coupling (42), and a bag (38) accommodated in said casing, **characterized by** the steps of:

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- molding a first shell (12) and a second shell (16), the first shell (12) having said front wall (44) with the coupling (42) formed therein, and an open end opposite the front wall; 15
- connecting the bag (38) to the coupling (42), such that a rear portion of the bag projects out of the open end of the first shell (12); 20
- fitting the second shell (14) over the projecting portion of the bag (38); and
- welding the first and second shells (12, 14) together. 25

9. Method according to claim 8, wherein the first and second shells (12, 14) are welded together by ultrasonic welding.

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10. Method according to claim 8 or 9, wherein the first and second shells (12, 14) are welded together by spot-welding.

11. Method of filling an ink bag (38) in a casing (10) wherein the bag (38) is accommodated in the casing (10) having a front wall (44) formed with a coupling (42) connected to the bag (38), wherein the casing further comprises a first shell (12) including said front wall (44) and a second shell (14) welded to the first shell (12) into a box-like configuration and the shells (12, 14) are fitted together at a seam (16) which passes essentially through the center of the side walls (18) of the casing in a plane essentially in parallel with the front wall (44), wherein each of the first and second shells (12, 14) has at least one flange (20) extending along said seam (16) and wherein the shells (12, 14) are spotwelded at these flanges, **characterised in that** ink is fed from outside container through the coupling (42) into the bag (38) whereby the air pressure within the casing (10) outside the bag (38) is kept in equilibrium with the air pressure outside the casing. 50

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Fig. 1

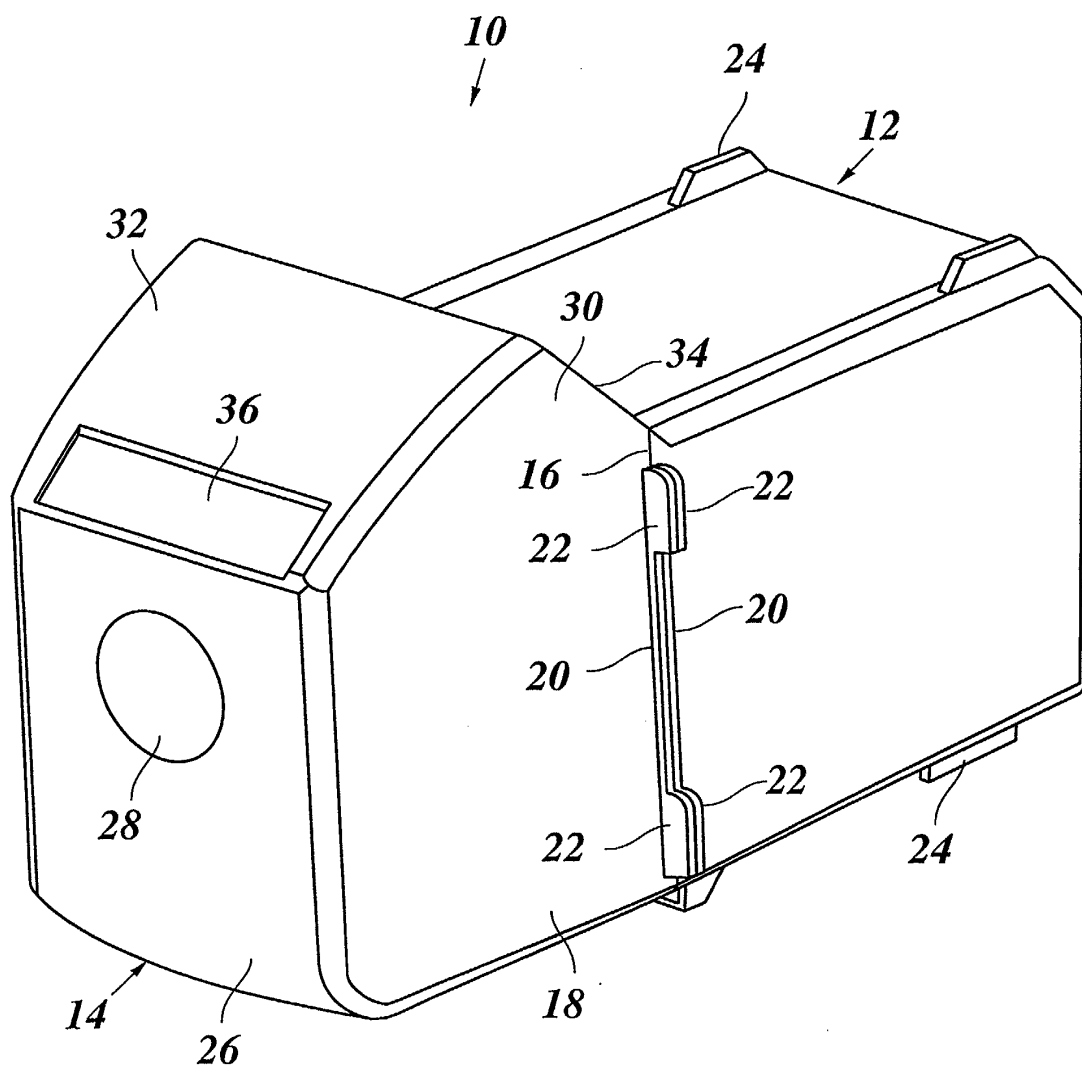


Fig. 2

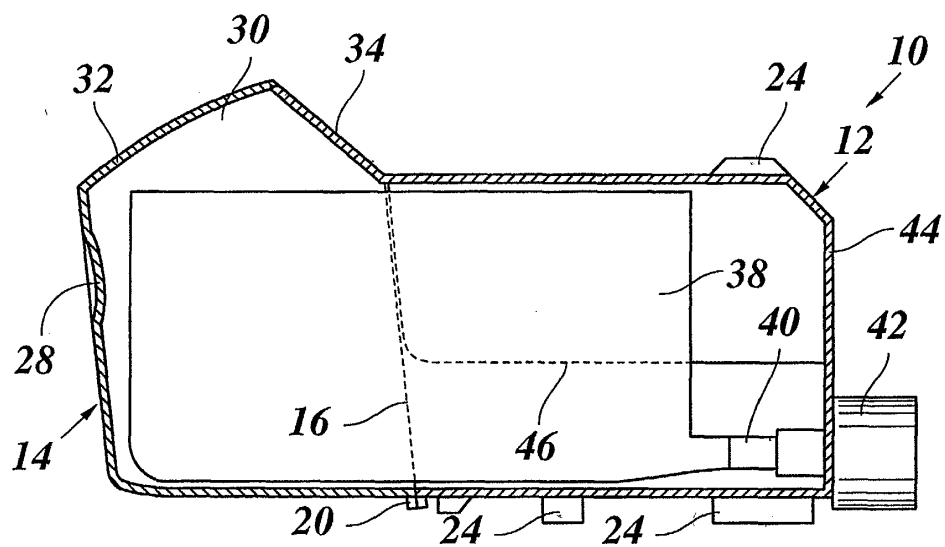


Fig. 3

