provided on lower edges of the body right side panel 104 and the body left side panel 106 through horizontal folding lines 122 and 123. The carton blank 126 includes a thermoplastic resin layer laminated at least on an inner surface thereof. The carton blank 126 is formed into a quadrangular tubular shape through bonding of a vertical edge portion 127 (see FIG. 15), and the sealing panel 117 continuously provided on the top upper surface auxiliary panel 110 of the tubular carton blank 126 is valley-folded along the horizontal folding line 116 (see FIG. 16). An inner surface of the sealing panel 117 and an inner surface of the top upper surface panel 108 are bonded to each other to seal the carton blank, and the right side panel 112 and the left side panel 113 having been folded are bonded to each other at respective overlapping surfaces to seal the carton blank. Thus, a flat top portion 128 is formed.

[0004] Hitherto, as a device for forming a bottom of a paper container, which forms a flatly-folded bottom of a paper container having a quadrangular tubular shape, there has been known the following device for forming a bottom of a paper container. Specifically, the device facilitates folding in such a manner that a tubular carton blank is fitted onto a mandrel, and a crease is made in a bottom forming panel of the tubular carton blank fitted onto the mandrel (for example, see Patent Literatures 1 and 2).

[0005] However, even with the same flatly-folded shape, the

left side panel of the carton blank, to protrude from a tip of the mandrel; valley-fold, along the horizontal folding line, the sealing panel continuously provided on the protruding top upper surface auxiliary panel; bond an inner surface of the sealing panel and an inner surface of the top upper surface panel to each other to seal the carton blank; and bond the right side panel and the left side panel having been folded at respective overlapping surfaces to seal the carton blank, thereby forming a top portion. The top forming part creasing mechanism includes: first creasing means that valley-folds, along the horizontal folding lines, the right side panel and the left side panel of the carton blank fitted onto the mandrel so as to spread out the right side panel and the left side panel from a center to an outer side of the carton blank; second creasing means that makes creases by inwardly mountain-folding the top upper surface panel and the top upper surface auxiliary panel, along the horizontal folding lines; and third creasing means that makes a crease by outwardly valley-folding the sealing panel, which is provided on the edge of the top upper surface auxiliary panel, along the horizontal folding line.

[0010] According to the invention described in claim 1, the first creasing means makes creases by spreading out the right side panel and the left side panel, which form the top forming part of the carton blank fitted onto the mandrel, from the center

shorter than an internal dimension L of the top forming part 129, an upper side 13b longer than the internal dimension L of the top forming part 129, and oblique sides 13c that have the same angle. As illustrated in FIG. 3, when the spreading member 13 is inserted into the top forming part 129, the oblique sides 13c valley-fold the right side panel 112 and the left side panel 114 along the horizontal folding lines 111 and 113 so as to spread out the right side panel 112 and the left side panel 114 from the center to the outer side, thereby making creases along the horizontal folding lines 111 and 113.

[0028] It is only required that the spreading member 13 can spread out the right side panel 112 and the left side panel 114 from the center to the outer side, and the spreading member 13 is not limited to this example.

[0029] Further, as illustrated in FIG. 1, the second creasing means 5 includes a first pressing member 14 and a second pressing member 15. The first pressing member 14 is supported so as to be capable of advancing to and retreating from the top upper surface panel 108, and is advanced to press the top upper surface panel 108 and mountain-fold the top upper surface panel 108 along the horizontal folding line 107. The second pressing member 15 is supported so as to be capable of advancing to and retreating from the top upper surface auxiliary panel 110, and is advanced to press the top upper surface auxiliary panel 110

and mountain-fold the top upper surface auxiliary panel 110 along the horizontal folding line 109.

[0030] In this example, the first pressing member 14 and the second pressing member 15 are fixed at proximal end sides thereof to rotation shafts 16 and 17. Along with rotation of the rotation shafts 16 and 17, the first pressing member 14 and the second pressing member 15 are rotated, and a distal end of the first pressing member 14 and a distal end of the second pressing member 15 can be advanced to and retreated from the top upper surface panel 108 and the top upper surface auxiliary panel 110, respectively. Further, as illustrated in FIG. 4, when the first pressing member 14 and the second pressing member 15 are rotated toward the top upper surface panel 108 and the top upper surface auxiliary panel 110, the distal end of the first pressing member 14 and the distal end of the second pressing member 15 are advanced to the top upper surface panel 108 and the top upper surface auxiliary panel 110, respectively, and the first pressing member 14 and the second pressing member 15 press, at the distal ends, the top upper surface panel 108 and the top upper surface auxiliary panel 110 from outer surface sides thereof. Thus, the first pressing member 14 and the second pressing member 15 mountain-fold the top upper surface panel 108 and the top upper surface auxiliary panel 110 along the horizontal folding lines 107 and 109, and make creases along the horizontal folding lines 107 and 109.

[0031] It is only required that the first pressing member 14 and the second pressing member 15 can press, at the distal ends, the top upper surface panel 108 and the top upper surface auxiliary panel 110 from the outer surface sides thereof, and can mountain-fold the top upper surface panel 108 and the top upper surface auxiliary panel 110 along the horizontal folding lines 107 and 109. The first pressing member 14 and the second pressing member 15 are not limited to this example.

[0032] Further, as illustrated in FIG. 1, the third creasing means 6 includes a receiving plate member 20 and a bending plate member 21. The receiving plate member 20 receives, on a plate surface thereof, an edge of the sealing panel 117 from an inner surface side of the sealing panel 117. The bending plate member 21 presses a joining portion between the top upper surface auxiliary panel 110 and the sealing panel 117 from the outer surface side toward the receiving plate member 20 so as to valley-fold the sealing panel 117 along the horizontal folding line 116.

[0033] In this example, as illustrated in FIG. 1, the receiving plate member 20 and the bending plate member 21 are arranged so as to be opposed to each other with a clearance, and are integrally formed with rear end sides of the receiving plate member 20 and the bending plate member 21 being connected to each other. A length of the receiving plate member 20 on a distal end side is longer than that of the bending plate member

21. A groove portion 22, which enables the sealing panel 117 to be inserted thereinto from an upper edge side of the sealing panel 117, is defined between the receiving plate member 20 and the bending plate member 21. Further, the receiving plate member 20 and the bending plate member 21 are supported so as to be capable of advancing to and retreating from the sealing panel 117.

When the third creasing means 6 is advanced, first, the edge of the sealing panel 117 is brought into abutment against the inner surface of the receiving plate member 20 (see FIG. 5 and FIG. 6). Along with further advance, the edge of the sealing panel 117 enters the groove portion 22 while sliding on the inner surface of the receiving plate member 20, and the outer surface of the sealing panel 117 is brought into abutment against the distal end of the bending plate member 21 (see FIG. 7). Along with still further advance, the distal end of the bending plate member 21 presses the joining portion between the top upper surface auxiliary panel 110 and the sealing panel 117 so as to valley-fold the sealing panel 117 along the horizontal folding line 116 (see FIG. 8). Thus, a crease is made along the horizontal folding line 116.

[0034] FIG. 9 is an illustration of another example of the third creasing means 6. In this example, the receiving plate member 20 is supported so as to be capable of advancing to and retreating from the inner surface side of the edge of the sealing

panel 117, and the bending plate member 21 is supported so as to be capable of advancing to and retreating from the joining portion between the top upper surface auxiliary panel 110 and the sealing panel 117.

The receiving plate member 20 is advanced so as to enable the edge of the sealing panel 117 to come into abutment against the plate surface of the receiving plate member 20 (see FIG. 10 and FIG. 11). The bending plate member 21 is advanced to press the joining portion between the top upper surface auxiliary panel 110 and the sealing panel 117 from the outer surface side toward the receiving plate member 20 (see FIG. 12), and brings the edge of the sealing panel 117 into abutment against and press contact with the plate surface of the advancing receiving plate member 20, thereby valley-folding the sealing panel 117 along the horizontal folding line 116 (see FIG. 13).

[0035] It is only required that the third creasing means 6 can valley-fold the sealing panel 117 along the horizontal folding line 116, and the third creasing means 6 is not limited to this example.

[0036] As described above, the first creasing means 4, the second creasing means 5, and the third creasing means 6, which are provided in the top forming part creasing mechanism 1, are operated in the order of the first creasing means 4, the second creasing means 5, and the third creasing means 6, and are arranged at such positions as to be prevented from disturbing

107 horizontal folding line

108 top upper surface panel

109 horizontal folding line

110 top upper surface auxiliary panel

111 horizontal folding line

112 right side panel

113 horizontal folding line

114 left side panel

115 suction port

116 horizontal folding line

117 sealing panel

118, 119 horizontal folding line

120, 121 bottom panel

122, 123 horizontal folding line

124, 125 bottom folding panel

126 carton blank

127 vertical edge portion

128 top portion

129 top forming part