

[54] **DEVICE FOR MAKING BAGS**
 [75] Inventor: **Hans Heinzer**, Beringen, Switzerland
 [73] Assignee: **SIG Schweizerische Industrie-Gesellschaft**, Neuhausen am Rheinfall, Switzerland
 [22] Filed: **Aug. 21, 1972**
 [21] Appl. No.: **282,566**

2,623,441 12/1952 Rose et al. 93/26
 3,094,905 6/1963 Haslacher 93/35 SB
 3,680,446 8/1972 James et al. 93/20 X
 3,464,181 9/1969 Hechenleitner 93/20 X
 2,294,215 8/1942 Sonneborn et al. 93/18

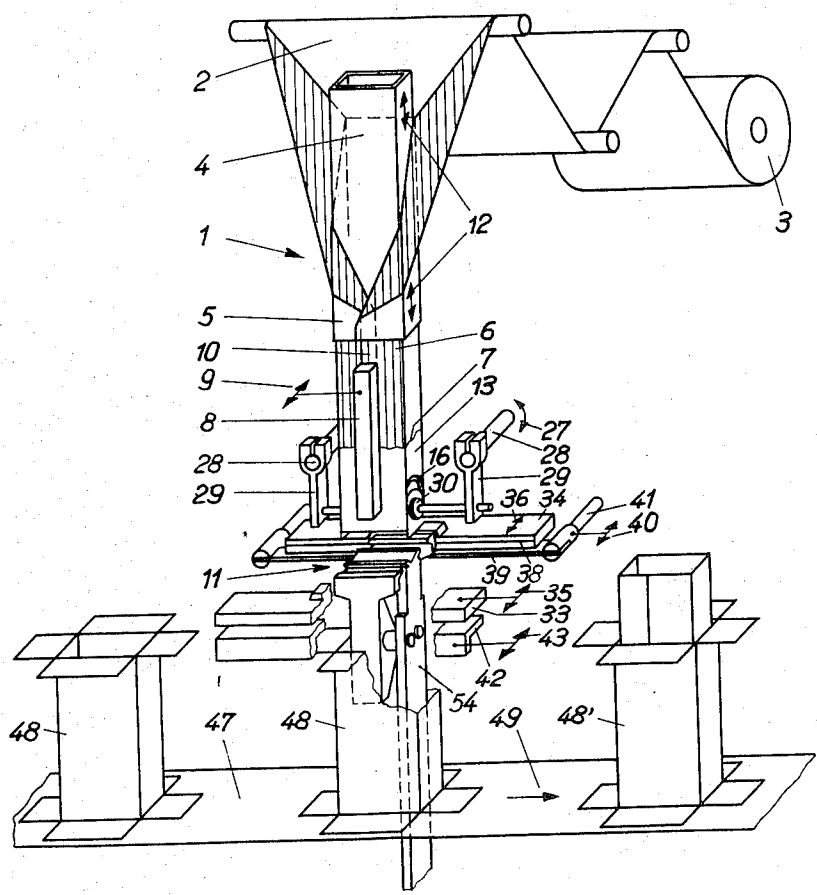
Primary Examiner—Andrew R. Juhasz
Assistant Examiner—James F. Coan
Attorney—Benjamin H. Sherman et al.

[30] **Foreign Application Priority Data**
 Sept. 1, 1971 Switzerland 12835/71
 [52] **U.S. Cl.** 93/18, 93/8 R, 93/35 SB, 93/36.01
 [51] **Int. Cl.** B31b 33/02
 [58] **Field of Search** 93/18, 19, 20, 26, 93/35 SB, 8 R, 36.01, DIG. 1, 21, 22, 23, 24, 27

[57] **ABSTRACT**
 A device for making bags is provided with an upright forming tube over which a tubular structure made of flexible sealable sheet material is moved downwardly step-by-step to be provided at its lower end, when projecting freely from the forming tube with a bottom by means of bottom seam dies during an interval the forming tube is moved upwardly while the tubular structure is clamped against movement. Subsequently, a double gripper seizes folded margins of the bottom and pulls the tubular structure downwardly and then the bag so formed is severed from the tubular structure.

[56] **References Cited**
UNITED STATES PATENTS
 3,263,391 8/1966 Wallsten 93/35 SB

8 Claims, 12 Drawing Figures



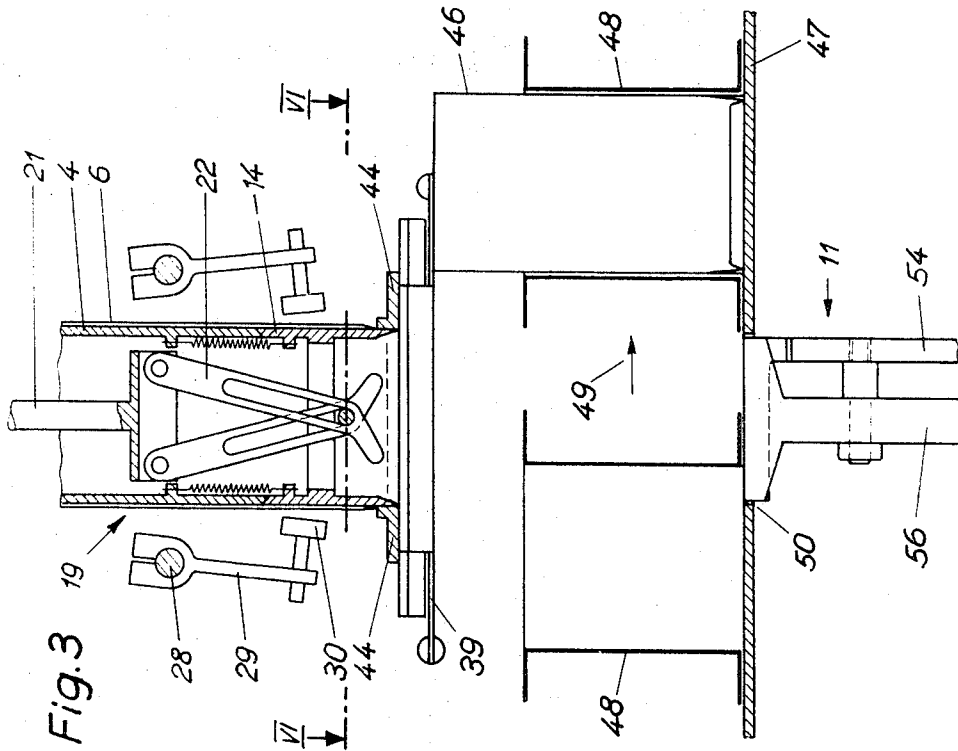


Fig. 3

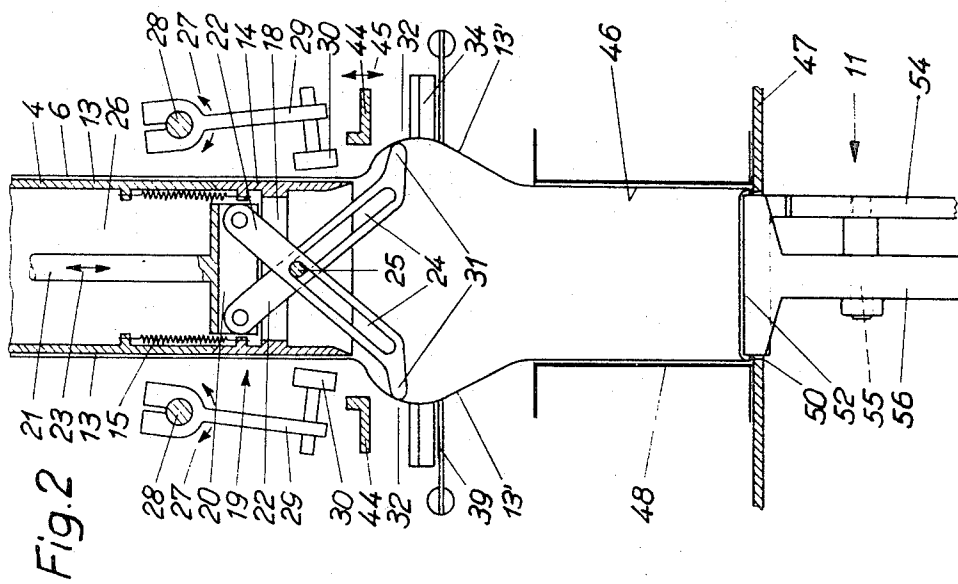
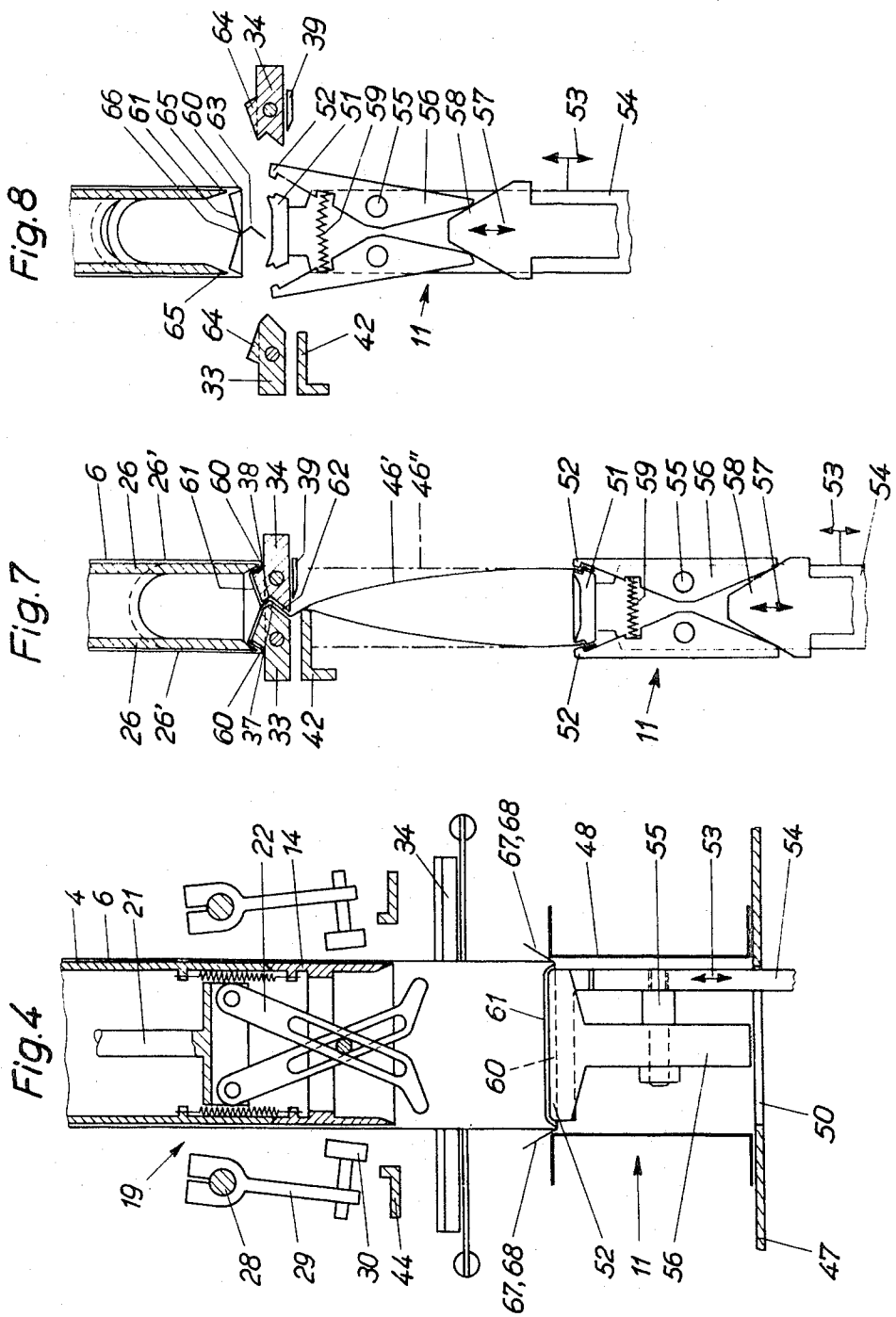


Fig. 2



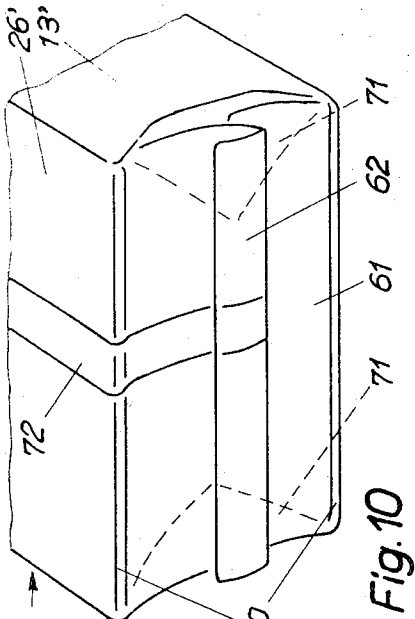


Fig. 10

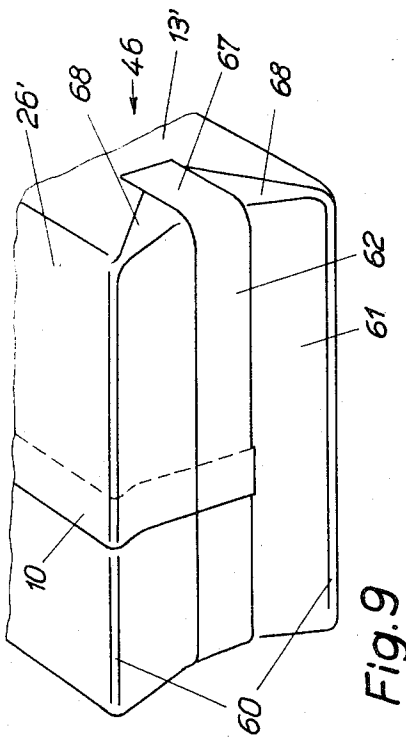


Fig. 9

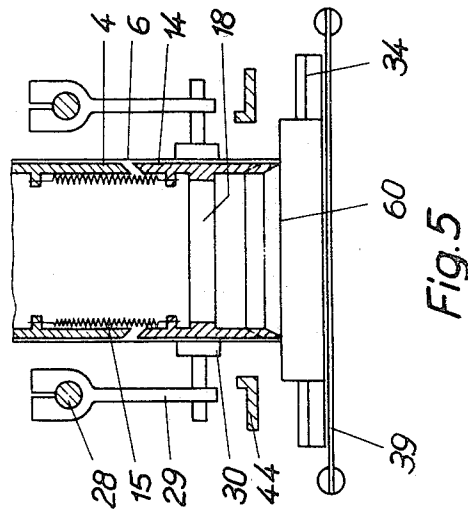


Fig. 5

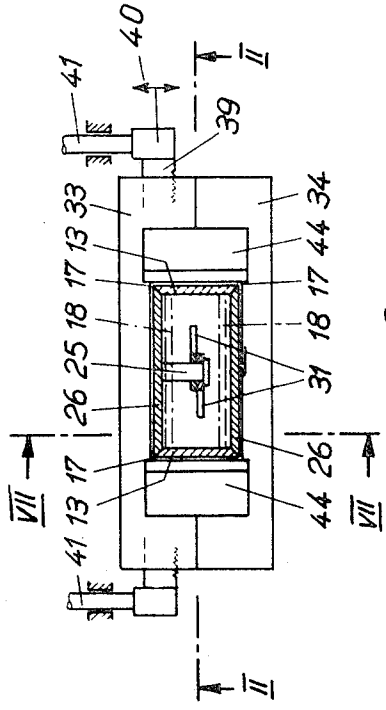


Fig. 6

DEVICE FOR MAKING BAGS

The invention relates to a device for making bags in which a tubular structure made of weldable or sealable flexible material is pulled over a forming tube and is withdrawn therefrom by a gripper arranged below the lower end of the forming tube and in which the bottom of the bag is formed with the assistance of oppositely movable bottom seam forming dies whereupon the tubular structure is transversely severed to separate the bag from the remaining tubular structure. The known devices of this type have the disadvantage that the bottom of the bag does not always have the desired uniform shape and rigidity and that the bag does not have all over the same cross section. Furthermore, the bottoms of the produced bags are not sufficiently stable or sturdy to permit an erection of the bags so that the bags either have to be laid down or have to be inserted into a cardboard box. In addition, the known devices of the mentioned type have only a relatively small capacity. The purpose of the invention is a device for making bags having stable or sturdy bottoms and which operates with a high capacity so that the mentioned disadvantages of the known devices are eliminated.

The device of the present invention is distinguished by control means which are arranged within the lower range of a vertically arranged forming tube which is movable upwardly and downwardly, whereby these control means grip the tubular structure periodically and hold it against slidable movement so that during a following upward movement of the forming tube two oppositely disposed marginal folds are formed on the lower edges of the tubular structure, whereby with the assistance of bottom seam dies, a bottom is formed on the bag and released from these edges and that the gripper is constructed as a double gripper in order to grip with two pairs of clamping dies the two exposed marginal folds, whereupon the so-formed bag is pulled downwardly and then is severed from the tubular structure.

The device of the invention will now be described with reference to the accompanying drawings which diagrammatically and by way of example illustrate one embodiment of the device.

IN THE DRAWINGS:

FIG. 1 illustrates in a perspective view a device of the invention for the making of bags.

FIGS. 2, 3 and 4 illustrate in a vertical sectional view along the line II—II of FIG. 6; the central portion and the lower portion of the device according to FIG. 1 are shown in three different phases of operation.

FIG. 5 shows a vertical section similar to the one illustrated in FIGS. 2, 3 and 4, but in another working phase and with the lower portion omitted.

FIG. 6 is a sectional view along line VI—VI of FIG. 3.

FIG. 7 is a sectional view along the line VII—VII of FIG. 6.

FIG. 8 illustrates the same sectional view as FIG. 7, but in another operating phase.

FIG. 9 is a perspective view of the bottom end of a bag made with the device of the invention.

FIG. 10 is a perspective view of the bottom end of a bag made with a modified device.

FIG. 11 illustrates a view of two gusset folders used in the device of FIG. 10, and

FIG. 12 is a side elevation view of the parts shown in FIG. 11.

Referring to FIG. 1 the inlet end of the device of the invention comprises a conventional tube-forming means 1 which pulls a continuous web 2 of flexible weldable plastic material from a supply roll 3. The device 1 is provided with a vertically disposed forming tube 4 having a rectangular cross section and which is surrounded by a folding box 5. The flexible web 2 is moved between the forming tube 4 and the folding box 5 and while this is done the web 2 is folded around the forming tube 4 to form a tubular structure. For the purpose of illustrating this formation of the tubular structure, a few parts of the flexible web 2 and the tubular structure 6 are provided in the drawing with vertical shade lines. The tubular structure 6 is, however, only illustrated in this manner up to the broken line 7 and beyond this line the tubular structure moves downwardly along the forming tube 4 and finally moves so far downwardly that it comes into the range of the bottom forming members described later on. An electrically heated welding die 8 extends lengthwise adjacent the forming tube 4 and is adapted to be moved a small distance horizontally in the direction of the double arrow 9. The longitudinal welding die 8 on one hand may be pressed against the overlapping margins of the flexible web material which is folded around the forming tube 4 in order to press these margins against the forming tube 4 so as to form a welded seam 10, while on the other hand this welding die 8 may again be moved away from the welded tubular structure 6 so that the tubular structure 6 may be slidably moved along the forming tube 4 when the tubular structure 6 is seized by gripping means 11 and is pulled downwardly. The forming tube 4 and the folding box 5 are movable about a small distance as it is indicated by the double arrow 12.

At the lower end of the forming tube 4 the two narrow walls 13 are provided each with an end piece 14 which are relatively vertically movable with respect to the forming tube 4. Each end piece 14 is normally held by a tension spring 15 in engagement with the narrow wall 13 along a beveled arch-shaped edge 16 (FIG. 1). This is illustrated in FIG. 2 but not in FIGS. 7 and 8. The two end pieces 14 are guided with their longitudinal edges 17 (FIG. 6) along the forming tube 4 and are braced by cross-ties 18 with respect to each other. In the interior of the forming tube 4 is arranged an expander device 19 which comprises two crosswise-arranged expander arms 22 pivotally mounted with one of their ends to a head 20 of a drive stem 21. The vertically disposed drive stem 21, as indicated in FIG. 2 by the double arrow 23 is vertically slidable and projects with its upper end from the upper end of the forming tube 4. This is, however, not shown in FIG. 1. The arms 22 are provided with longitudinal slots 24 to which extends at the crossing point a horizontal pin 25 which extends from one of the wide side walls 26 of the forming tube 4.

Outside of the two narrow side walls 13 are arranged two stationarily mounted oppositely rotatable shafts 28, the movability of which is indicated by the curved double arrows 27. On these two shafts 28 are clamped two arms 29, each free end of which carries a pressure member 30. These members 30 are provided for holding the tubular structure 6 in engagement with the end pieces 14. The lower ends of the expander arms 22 are

provided with angularly directed ends 31 which in the expanded position illustrated in FIG. 2 urge the narrow side walls 13' of the tubular structure 6 apart as shown at 32.

On the outside of the wide side walls 26 are arranged two oppositely disposed electrically heatable bottom seam dies 33 and 34 which are adapted to be moved in horizontal direction as indicated by the double arrows 35 and 36. These dies 33 and 34 are provided with edges 37 and 38 which are used for pressing against each other oppositely disposed transverse strips of the wide walls 26. Below the die 34 is arranged a knife 39 which is attached to two knife carriers 41 (FIG. 6) which are horizontally slidable in the direction of the double arrow 40. Below the die 33 is arranged a counterblade 42 which is movable in the direction of the double arrow 43 (FIG. 1) in order to hold the tubular structure 6 against the knife 39 so that the tubular structure may be severed. Outside of the narrow walls 13 are also arranged, as shown in FIGS. 2, 3 and 6, two angularly-shaped "ear pressers" 44 which according to the double arrow 45 (FIG. 2) are vertically slidable. For the sake of clearness the "ear pressers" 44 are not illustrated in FIG. 1.

At a vertical distance from the lower end of the forming tube 4, which is somewhat greater than the height of the bag 46 to be produced (see FIG. 3), is arranged a table 47 along which are moved horizontally step-by-step cardboard boxes 48 by means of a not-illustrated conveyor of known construction in the direction of the arrow 49 (FIGS. 1 and 3). The boxes 48 in the present case are intended for packaging bags 46 but, of course, these bags 46 may also be used without the boxes 48. In the table 47 is arranged an aperture 50 through which the gripper 11 may be moved upwardly and downwardly.

The gripper 11 is constructed as a double gripper in that it is provided with two pairs of clamping jaws 51 and 53. The clamping jaws 51 are fixedly mounted on the upper end of a mounting plate 54 which with respect to the table 47 is vertically slidable in a direction indicated by the double arrow 53. (FIG. 8). The clamping jaws 52 (FIGS. 2, 3, 4, 7) are arranged at the upper ends of two levers 56 which at the points 55 are pivotally attached to the plate 54, whereby the lower ends of the levers 56 may be spread apart in the direction of the double arrow 57 with respect to the plate 54 by a slidable wedge member 58. In this manner the jaws 52 are moved toward the jaws 51 by overcoming the force of a pressure spring 59 arranged between the jaws 52. When this takes place two longitudinal folds 60 of the bottom of the bag 61 are gripped.

The bottom 61 of the bag is formed when the two bottom seam dies 33 and 34 press the wide walls 26' of the tubular structure 6 between them together, while the narrow walls 13' of the tubular structure 6 at 32 are spread apart by the ends 31 of the expander arms 22 as this is illustrated in FIG. 2. The complimentary margins 37 and 38 form thereby a welding seam 62 extending in longitudinal direction of the bottom 61, whereby the welding seam 62 is provided with a kinking edge 63. The dies 33 and 34 forming the bottom seam are provided on their parts which come to lie below the forming tube 4 with two symmetrically upper wedge-shaped projections 64 (FIGS. 7, 8) which in connection with sharpened lower edges 65 on the parts 14 form in the wide walls 62 the longitudinal marginal folds 60 and at

the same time produce a slight kink 66 in the bottom 61 during the formation of the welding seam 62 when the forming tube 4 after the formation of the welding seam 62 is raised from the position illustrated in FIG. 1 to the downwardly moved position shown in FIG. 7. When this takes place the expander device 19 is moved from its expanded position shown in FIG. 2 into the position shown in FIG. 3, whereby the pin 25 moves with the forming tube 4 downwardly, while at the same time the drive stem 21 is pulled upwardly. Laterally outwardly of the lower end of the forming tube 4 are positioned the ends 67 (FIG. 9) of the welding seam 62 and also the somewhat triangularly-shaped "ears" formed by the double folding parts 68 which are produced during the formation of the bottom. These double folding parts 68 are pressed during the downward movement of the presser 44 onto the adjacent dies 33 and 34 forming the bottom seam (FIG. 6) and in this manner are welded together. The welding seam 62 of the bottom 61 is connected according to FIG. 7 with a portion of the tubular structure 6 designated with 46' which corresponds to a previously formed bag. If now by means of an opposite movement of the knife 39 and the counterblade 42 the tubular structure is severed, then the wide walls of the completed bag 46'' which is opened at its upper end are stretched.

After severance of the tubular structure 6 below the welding seam 62 the two arms 29 are pivoted inwardly so that the pressure parts 30 hold the tubular structure 6 against the end parts 14 of the narrow walls 13 of the forming tube 4 as this is shown in FIG. 5. Accordingly, the end parts 14 remain with the bottom 61 somewhat behind when now the forming tube 4 is raised from the position shown in FIG. 7 to the position shown in FIG. 8, so that the two longitudinal folds 60, which subsequently are released by the transverse welding dies 33 and 34, are seized by the clamping pairs 51 and 52 of the double gripper 11 and may now be pulled downwardly as soon as the pressure members 30 have released the tubular structure 6. This is illustrated in FIG. 4, which illustrates the operating phase in which the bottom 61 by the double gripper 11 has been moved downwardly up to the upper edge of the aperture 50 in the table 47 below which the box 48 is arranged so that the end parts 67 of the seam 62 which were placed by the center portion of the clamping jaw 51 against the bottom of the bag together with the ears 68 are moved into the latter and engage the narrow walls of the bags 46 as this is shown in FIG. 9 in which, however, the box 48 has been omitted.

The bag 46 which is now positioned in the box 48 can now be filled with the material to be packed in one of the following stations as is shown at 48', whereupon the upper opening of the bag 46 is closed by a welding operation while the closing of the bottom and the cover of the cardboard box is accomplished in known manner in other following stations.

The bags produced in the described device, even when the working speed is very high, will always have a rectangular bottom so so that the bags may always be filled with the required amount of material. The stability of the bottom 61 is such that the bags 46 will always be positioned upright and there is no danger of tilting. This is particularly of advantage when the bag 46 is filled without the box 48 or is surrounded only by a short rectangular sleeve, namely by a box structure without bottom or cover. Such a sleeve may only be

used for the purpose of moving the bag 46 from its position of production to the other stations where the bags are filled, closed and then removed.

In the event that the filled bag is used without a box or a sleeve, it is recommended to employ a modified construction of the described device in which the bottom welding seam does not have any end portions 67 which are to be folded against the narrow side walls. In such a modified construction of the device the expander device 19 is omitted and in place thereof are employed two plate-shaped gusset folders 69 as shown in the FIGS. 11 and 12. These gusset folders 69 are arranged directly above the transverse welding dies 33 and 34 and are provided with points 70 which are directed toward the narrow walls 13' of the tubular structure 6. If the gusset folders 69 are moved inwardly immediately before the production of the welding seam 62 then they form above the bottom 61, as illustrated in dash lines in FIG. 10, inwardly turned folding gussets 71. Furthermore, the length of the welding seam which is placed again against the bottom 61 does not have any more the length of the bottom. FIG. 10 also discloses in addition a longitudinal welding seam 72 which is not an overlapped seam as is the longitudinal seam 10, but comprises a cover seam which is folded onto the wide wall 26' of the bag. For the formation of a cover seam it is known that two marginal zones which are displaced 90° in their plane are welded together so that in place of the single longitudinal welding die 8 one has to employ two longitudinal welding dies which are moved parallel relative to each other with respect to the width of the forming tube.

The web 2 need not consist necessarily of weldable plastic, but it can also consist, for instance, of paper which is provided with a heat sealable or cold sealable layer. In the last-named case one employs in place of the heatable welding dies simple pressure dies for the formation of the seam. The seam formation may also be accomplished by pressure and heat produced by finishing dies.

One may also employ as a starting material a tubular structure which is unwound from a roll and threaded onto the forming tube 4 so that the folding box 5 and the longitudinal welding die 8 are not necessary. In the last-named case it is, however, required that the forming tube 4 and the drive stem 21 which extend above the upper part of the tubular structure and outside of the same are coupled with suitable driving means. This may be accomplished in conventional manner, but is somewhat complicated. Furthermore, the bottom 61 of the bag 46 need not necessarily be provided with four corners, but these corners may be rounded or beveled. In fact, even a round cross section of the bag could be used.

It is obvious that the illustrated device may produce bags 46 when the same as a whole are rotated in space so that the forming tube 4 no longer is disposed vertically.

What I claim is:

1. Device for making bags comprising an upright forming tube over which a tubular structure made of a flexible sealable sheet material is moved and withdrawn therefrom by gripping means engaging said tubular structure at the lower discharge end of said forming tube, oppositely movable bottom seam dies for forming the bottom of said bag, and means for severing said bag from said tubular structure, wherein the improvement

comprises reciprocable control members arranged at the discharge end of said forming tube for periodically engaging said tubular structure so as to hold it against displacement and to release two opposite lower margins of said tubular structure from the lower edges of the forming tube during a subsequent upward movement of said forming tube, said bottom seam dies forming said bottom of said bag during an upward movement of said forming tube by engaging and folding said two released and exposed lower margins of said tubular structure, said gripping means comprising a double gripper having two pairs of clamping jaws which grip the exposed folded margins to pull the bag formed downwardly to permit said severing means to cut said bag from said tubular structure.

2. Device according to claim 1, in which two oppositely disposed walls (18) of said forming tube (4) are provided at their lower ends with recesses in which parts (14) are slidably inserted against which the tubular structure is periodically pressed by exteriorly arranged pressure members (30), said parts and pressure members forming said control means which periodically hold said tubular structure against slidable displacement.

3. Device according to claim 1, in which said bottom seam dies (33, 34) are provided with wedge-shaped projections at their upper faces which come to lie below said forming tube during the formation of the bottom of the bag and together with pointed lower edges (65) of the wide faces (26) of the forming tube produce said folded margins (60).

4. Device according to claim 1, in which said bottom seam dies (33, 34) are shaped in such a manner that the same produce during the formation of the bottom of the bag in the bottom seam (62) a kink (66).

5. Device according to claim 1, including an upwardly and downwardly movable expander device (19) in said forming tube (4) said expander device comprising two intersecting expander arms (22), the lower end of which are adapted to engage opposite parts of said tubular structure immediately prior to the formation of the bottom seam (62) above said bottom seam dies (33, 34) to expand said tubular structure laterally beyond the perimeter of said forming tube (4), and including upwardly and downwardly movable presser members (44) for subsequently forming double folding parts (68) from said tubular structure pressed upon the closed dies (33, 34).

6. Device according to claim 1, including gusset folding means (69) disposed directly above said bottom seam dies (33, 34), said gusset folding means have points (70) facing said tubular structure (6) and which when moved inwardly produce turned in folded gussets (71) directly against the bottom (60).

7. Device according to claim 1, including means for forming said tubular structure, said forming means comprising a folding box (5) and a longitudinal seam forming die (8) extending lengthwise of the tubular structure after it has been folded, said forming means being provided with a supply roll from which a web of flexible material is drawn into said folding box to form therein said tubular structure.

8. Device according to claim 7, in which said forming tube is surrounded by said folding box and in which said tubular structure is formed around said forming tube in the circumferential space between the latter and said folding box.

* * * * *