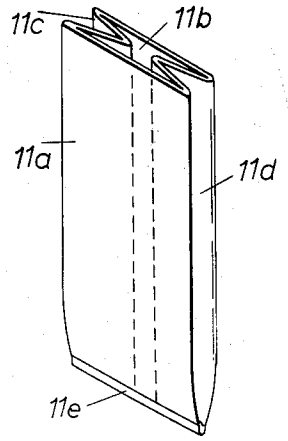
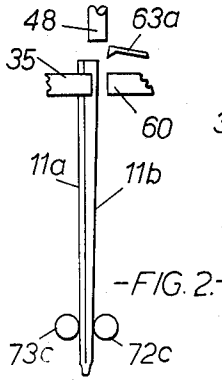
July 12, 1966 R. W. BARRACLOUGH 3,260,170

FORMING OF CONTAINERS FROM BAGS

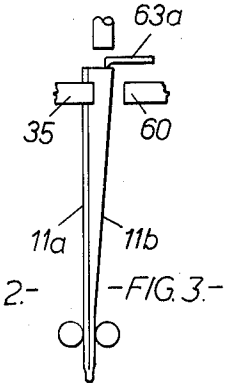
Filed Dec. 26, 1963 4 Sheets-Sheet 1



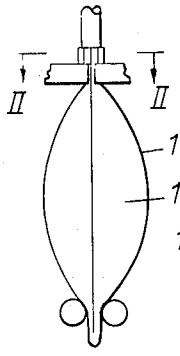
-FIG. 1.-



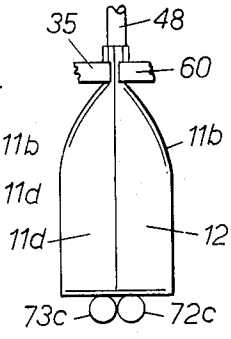
-FIG. 2.-



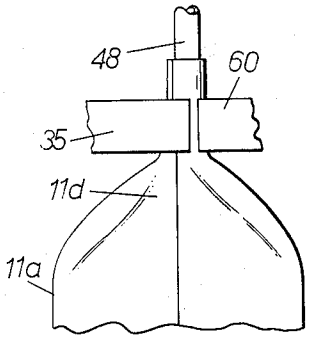
-FIG. 3.-

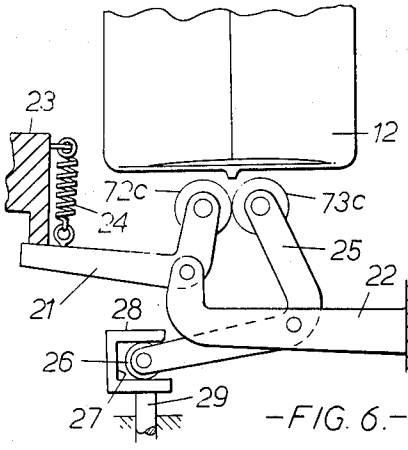


-FIG. 4-

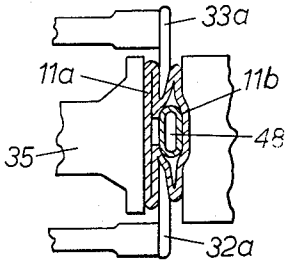


-FIG. 5.-





-FIG. 6.-



-FIG. 7.-

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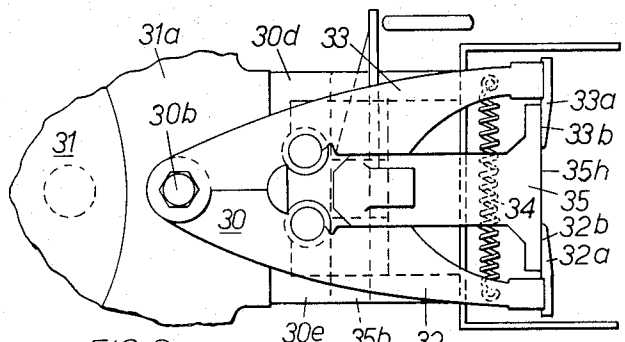
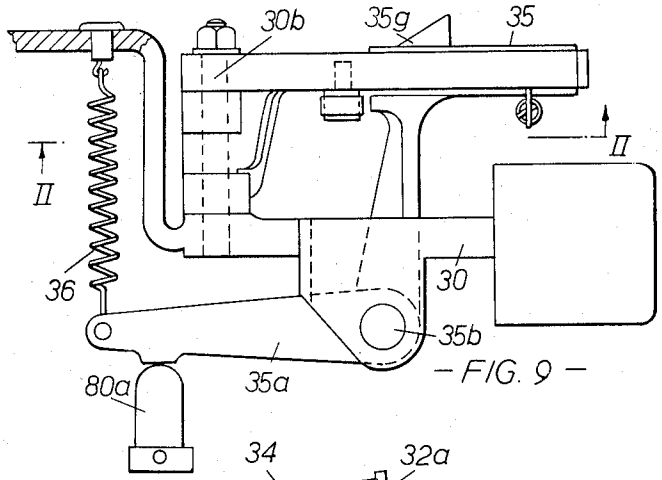
July 12, 1966 R. W. BARRACLOUGH 3,260,170

FORMING OF CONTAINERS FROM BAGS

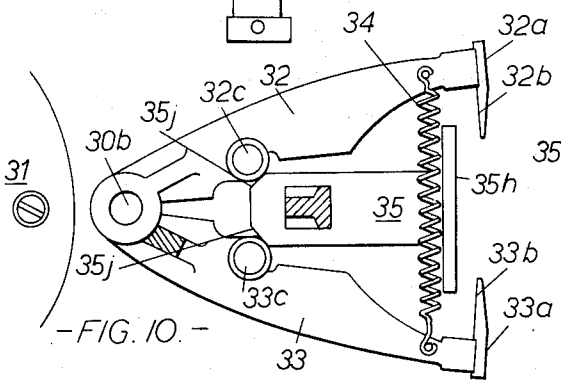
Filed Dec. 26, 1963 4 Sheets-Sheet 2



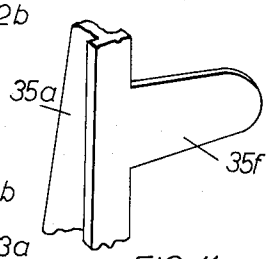
-FIG. 8-



-FIG. 9-



-FIG. 10.-



-FIG. 11.-

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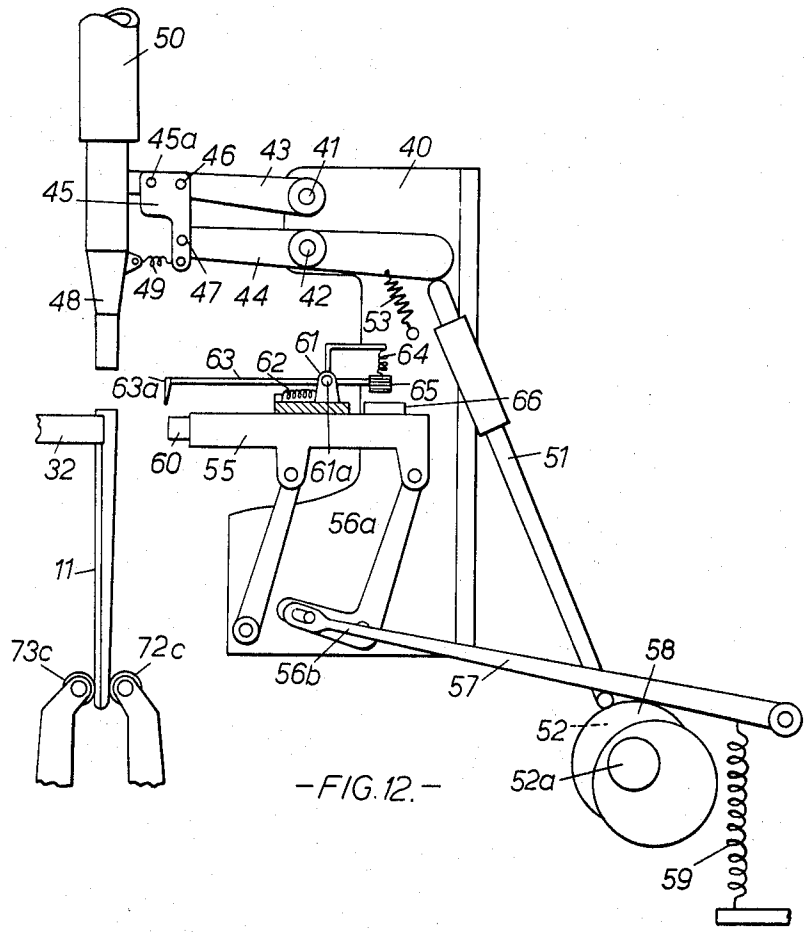
July 12, 1966 R. W. BARRACLOUGH 3,260,170

FORMING OF CONTAINERS FROM BAGS

Filed Dec. 26, 1963 4 Sheets-Sheet 3



-FIG. 12.-

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July 12, 1966 R. W. BARRACLOUGH 3,260,170

FORMING OF CONTAINERS FROM BAGS

Filed Dec. 26, 1963 4 Sheets-Sheet 4

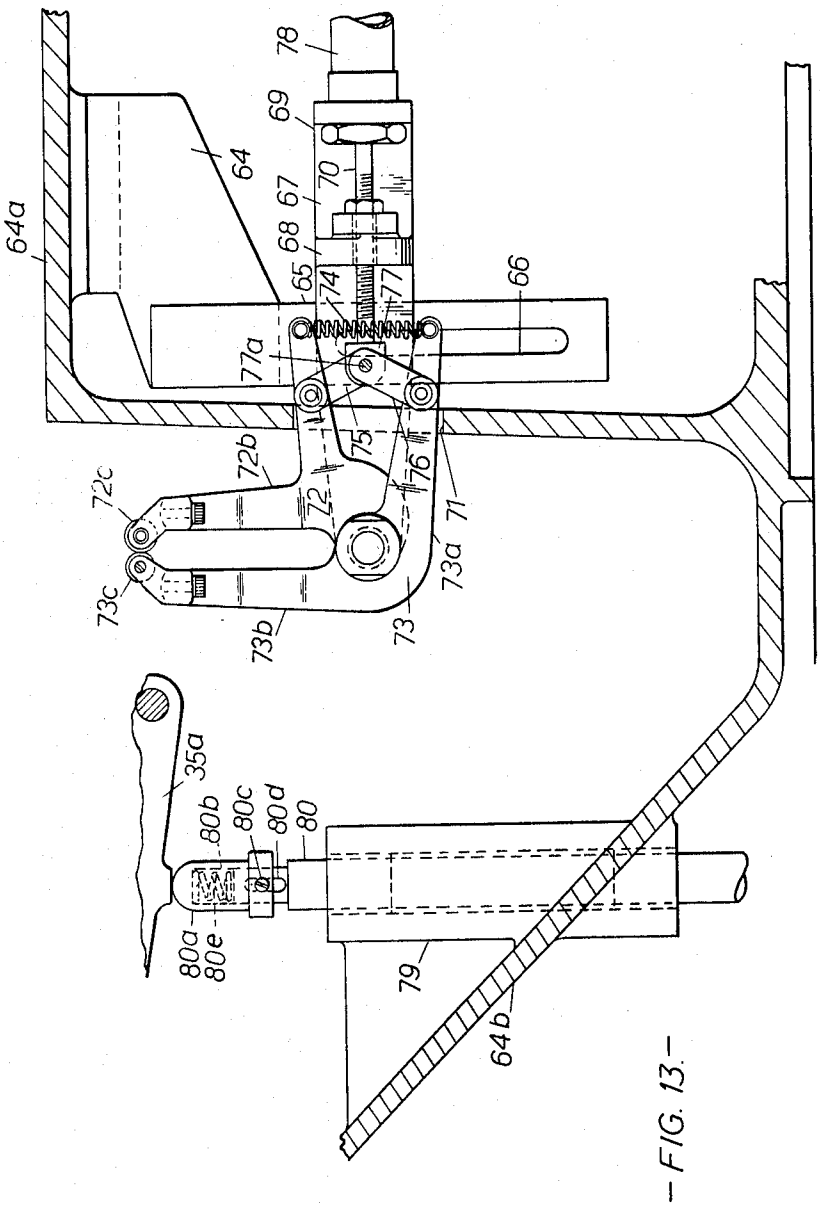

FIG. 13.

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United States Patent Office 3,260,170 Patented July 12, 1966

3,260,170

FORMING OF CONTAINERS FROM BAGS

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Filed Dec. 26, 1963, Ser. No. 333,377
Claims priority, application Great Britain, Jan. 5, 1963, 604/63
8 Claims. (Cl. 93—8)

The present invention relates to containers having block bottoms and more particularly to the forming of such containers from gusseted bags.

It is known to form a bag from a length of gusseted tubing, comprising two plane faces connected by two gusseted side walls, by attaching together the two plane faces near an end region of the length and securing the end regions of the gusseted side walls between the attached regions of the plane faces.

A bag of the type referred to above can be conveniently formed from a length of heat sealable gusseted tubing by collapsing the gusseted side walls, so that the plane faces of the tube lies in close relationship with the gusseted side walls between them, and then applying heat and pressure to a transverse section of the tubing to fuse the plane faces and the gusseted side walls together in a single weld over said section.

The object of the present invention is to provide an arrangement for forming a bag having gusseted side walls into a block bottom container.

According to one aspect of the invention, in apparatus for forming a container with a block bottom from a length of gusseted tubing having one end closed, support means are provided for supporting the length of gusseted tubing in the region of the upper open end thereof and first and second members define a restricted opening through which the lower regions of the length of tubing pass so that the closed end of the length of tubing is in parallel relationship to said restricted opening whereby on the inflation of the length of tubing by the introduction of gas into the open end thereof the lower regions of the length of tubing are drawn upwardly through said restricted opening to enable a folding action to take place to give a block bottom to the container so formed.

According to another aspect of the invention, in apparatus for forming a container with a block bottom from a length of gusseted tubing having one end closed, support means are provided for supporting the length of gusseted tubing in the region of the upper open end thereof and the lower regions of the length of tubing adjacent the closed end thereof are positioned between two rollers arranged in parallel relationship to said closed end whereby on the inflation of the length of tubing by the introduction of gas into the open end thereof the lower regions of the length of tubing are drawn upwardly between the rollers so that a folding action takes place to give a block bottom to the container so formed.

The invention will be better understood from the following description taken in conjunction with the accompanying drawings comprising FIGS. 1 to 13. In the drawings

FIGS. 1 to 5 show various stages in the formation of a container having a block bottom,

FIG. 6 shows diagrammatically one embodiment for forming the block bottom,

FIG. 7 shows a section through the mouth of the bag and nozzle on the line II—II of FIG. 4,

FIG. 8 shows a plan view of the supporting means for the bag,

FIG. 9 shows a side view of the supporting means shown in FIG. 8,

FIG. 10 shows a plan view of the supporting means from below, showing the jaws in the open condition,

FIG. 11 is a detail view of a section of the rear jaw lever assembly,

FIG. 12 is a side view of the blow open arrangement, and

FIG. 13 is a side view of another embodiment for forming a block bottom.

The invention has particular application to a machine for forming, charging and sealing containers made from a gusseted tube of semi-rigid material in which a flat or block bottom is required for the container. Such a machine is described and claimed in our Patent No. 3,112,588 but it is to be clearly understood that the invention is not limited to use with such a machine but can be employed in any machine for forming a container where a block bottom is required and where the material of the container has little rigidity.

In the machine described in our Patent No. 3,112,588 a circular turret has a plurality of gusseted tubing supporting means equally spaced about and projecting forwardly from its peripheral edge. An equal plurality of fixed stations are arranged equally spaced about the turret and the turret is arranged to be indexed through a predetermined angle to bring each gusseted tubing supporting means into alignment with a fixed station during dwell periods of the turret. It can therefore be seen that each supporting means passes each of the fixed stations during one complete revolution of the turret and after each indexing movement of the turret, the supporting means will be locked exactly opposite a fixed station.

Usually different operations take place at the different fixed stations. Thus at the first station, a continuous length of gusseted tubing is advanced until a predetermined length has been fed into the supporting means, whereupon a shearing arrangement is operative to sever the length of tubing which is now held along the upper edges by the supporting means. The tubing is held by the supporting means during the whole of the forming, charging and sealing operations.

The supporting means is now indexed by the turret to a second station where the lower end of the tubing is sealed thereby forming the tubing into a bag. In this operation the two parallel plane surfaces **11***a* and **11***b* (FIG. 1) of the bag and the gusseted side walls therebetween, **11***c* and **11***d*, are welded together in a single transverse seam **11***e*.

The supporting means are then indexed passed further fixed stations at which operations take place which are of no interest as far as the present invention is concerned. Eventually the supporting means are indexed to a fixed station at which the bag is inflated to form a container having a flat or block bottom, and it is at this station that the means according to the invention are applied.

At subsequent stations, the container is charged, the open end sealed and the charged and sealed container is discharged from the machine.

Before proceeding with a detailed description of the arrangement according to the invention, a description will be given of the supporting means for the container.

Thus referring to FIG. 8, the gusseted tubing supporting means, generaally indicated by numeral **30** is secured to the peripheral flange **31***a* of the turret **31** and comprises two side jaws **32** and **33**, pivotally mounted on a pin **30***b* and spring-loaded towards one another by a coil spring **34**, and a back jaw **35** between said side jaws **32** and **33**. The back jaw **35** is mounted on the upright limb of a bell crank lever **35***a* (FIG. 9) which lever **35***a* is pivotally mounted on a pin **35***b* between side walls **30***d* and **30***e* of turret **31** and the lever **35***a* is spring-loaded to urge back jaw **35** outwardly relative to the turret **31**

by a coil spring 36. Bell crank lever 35*a* has a side projecting portion 35*f* (FIG. 11) and the jaw 35 has an abutment 35*g* (FIG. 9) projecting upwardly therefrom, parts 35*f* and 35*g* being individually adapted to be engaged by a push rod or the like from any one of the stations to cause jaw 35 to be rearwardly displaced against the tension of spring 36. Each of the side jaws 32 and 33 carries an inwardly directed shoe 32*a* and 33*a* (FIG. 8) respectively on its outer end, said shoes 32*a* and 33*a* presenting inner surfaces 32*b* and 33*b* respectively which cooperate with the foward edge 35*h* of jaw 35 to form the gripping surfaces of the jaws. Each side jaw 32 and 33 also has a roller 32*c* and 33*c* respectively, which rollers are engaged by inclined surfaces 35*j* on the back jaw 35. In a closed position of the supporting means 30, jaw 35 tends to take up its forward position due to its spring 36. Jaws 32 and 33 are urged inwardly against the sides of jaw 35 by their spring 34, and the forward edge 35*h* of jaw 35 applies a forward pressure against the surfaces 32*b* and 33*b* of the jaw shoes 32*a* and 33*a* respectively.

When a push rod or the like is advanced against part 35*f* and 35*g*, jaw 35 is rearwardly displaced against the tension of spring 36, jaws 32 and 33 remaining closed until the inclined surfaces 35*j* of jaw 35 engages rollers 32*c* and 33*c*. Further rearward displacement of jaw 35 causes rollers 32*c* and 33*c* to be forced outwardly thereby opening jaws 32 and 33 against the tension of spring 34.

The above sequence of operations is reversed as the jaw 35 is allowed to advance forwardly, that is, as jaw 35 advances rollers 32*c* and 33*c* ride down inclined faces 35*j* to allow jaws 32 and 33 to adopt a closed position and in the final stages of the advancement, jaw 35 advances to engage surface 32*b* and 33*b*.

Reference will now be made to FIGS. 12 and 13 which shows the apparatus at the station where the container is inflated and block bottom formed. A casting 40 (FIG. 12) presents pivot pins 41 and 42 for pivotally supporting two levers 43 and 44. A nozzle mounting plate 45 is pivotally connected by pivot pins 46 and 47 to the ends of the levers 43 and 44. The link members 43 and 44 are arranged substantially parallel and the pitch between the two pivotal connections on each pivotal lever 43 and 44, i.e. the pitch between pins 41 and 42 and the pitch between pins 46 and 47, is the same so that the vertical disposition of mounting plate 45 is always the same.

The plate 45 has a nozzle 48 pivotally mounted thereon by a pivot pin 45*a* and a coil spring 49 is provided for maintaining nozzle 48 in a substantially vertical position. Nozzle 48 is connected to a high pressure source (of air or other suitable gas) by way of a flexible conduit 50.

Pivotal lever 44 extends rearwardly beyond pivot pin 42 and is rotated in an anticlockwise direction by a push rod 51 actuated by a cam 52, a coil spring 53 being provided for causing the pivotal lever 44 to tend to rotate in a clockwise direction to maintain the said lever 44 in engagement with a push rod 51.

Casting 40 also pivotally supports an arm 54, which is pivotally connected at its upper end to a pad carrier 55, and a bell crank lever 56, which is pivotally connected near its mid region to casting 40, has one of its arms 56*a*, pivotally connected to the pad carrier 55 and its other arm 56*b* connected to a cam follower 57. The cam follower 57 is engaged by a cam 58 and is held in engagement with cam 58 by a coil spring 59.

The pitch of the two pivotal connections on pivotal arm 54 the same as the pitch of the mid-pivotal connection of bell crank lever 56 and the pad carrier pivotal connection on arm 56*a*, whereby the axis of pad carrier 55 remains substantially constant for all the positions thereof.

Pad carrier 55 has a substantially resilient pad 60 mounted on its forward end and a bearing bracket 61 slidably mounted on its upper regions, bracket 61 being loaded by a spring 62 towards the pad 60. A lever 63 is pivotally connected to bracket 61 by a pin 61*a* and a spring 64 causes lever 63 to tend to rotate in an anticlockwise direction. The lever 63 has an electromagnet 65 mounted near its rear end, which cooperates with a soft iron block 66 secured to the pad carrier 55, and a beak 63*a* is securely mounted on the forward end of lever 63.

A bracket 64 (FIG. 13) is secured to the underside of the structure 64*a* on which the casting 40 is mounted and has secured thereto a support plate 65. The support plate 65 is provided with a slot 66 and a support member 67 is adjustably secured to the support plate 65 by a nut and bolt, the latter passing through the slot. The position of the support member is thus adjustable to enable containers of different length to be accommodated by the machine. The support member 67 is provided with two bearings 68 and 69 through which an operating rod 70 passes freely. The support member 67 passes through an opening 71 in the side wall of the turret and carries at its end two pivotal bell crank levers 72 and 73. The arms 72*a* and 73*a* of the bell crank levers are connected by a spring 74 which tends to draw the two arms together. The arms are held apart by two links 75 and 76 which are pivotally secured to the arms 72*a* and 73*a*, the other ends of the links being pivotally mounted on a pin 77*a* in the shackle 77 which is secured to the end of the operating rod 78. The other arms 72*b* and 73*b* of the levers 72 and 73 carry nylon-covered rollers 72*c* and 73*c* which, in the position of the levers shown in the drawing, grip the bag along a region parallel to and somewhat above the weld 11*c*.

The operating rod 70 terminates in a piston (not shown) housed within the cylinder 78 which is connected to a suitable source of air pressure for controlling the movement of the rod towards the left or the right. In the drawing the rod is shown in the extreme right-hand position, in which position the rollers 72*c* and 73*c* grip the bag as previously explained. Movement of the rod towards the left from the position shown in the drawing is effective through links 75 and 76 in allowing the spring 74 to rotate the bell crank lever 72 in an anticlockwise direction and the bell crank lever 73 in a clockwise direction whereby the rollers 72*c* and 73*c* are separated.

The structure carrying the fixed stations is also provided, at the particular station being considered, with a sloping portion 64*b* which carries a tubular bearing 79 for a push rod 80. The upper end of the push rod is provided with a resiliently mounted dome 80*a* which engages with the underside of lever 35*a* (FIG. 9). As shown in the drawing the dome is provided with an internal cylindrical cavity 80*b* into which extends the end of the push rod 80, a pin 80*c* in the dome working in a slot 80*d* in the push rod 80. A spring 80*e* is located between the upper end of the cavity 80*b* and the upper end of the push rod 80, the tension of the spring being such that, in the position of the push rod 80 shown in the drawing, it has substantially no restraining effect on the movement of back jaw 35. However, when the push rod is moved vertically and the spring 80*e* is thereby compressed, the engagement between the dome 80*a* and the underside of lever 35*a* holds the lever 35*a* against any anticlockwise rotation about its pivot 35*b*. The purpose of this arrangement will be described later.

The apparatus operates as follows. When the supporting means 30 for the bag is indexed to the station under consideration, the bag 11 is held in the support means with the face 11*a* of the bag against the back jaw 35 and with the side jaws 32 and 33 closed, the shoes 32*a* and 33*a* entering the gussets 11*c* and 11*d* of the bag. The operating rod 70 is at this time in its extreme left hand position so that the rollers 72*c* and 73*c* are separated. As the supporting means are indexed to the position shown, the lower regions of the bag are guided between the two rollers 72*c* and 73*c* and the upper regions of the

bag come into substantially vertical alignment with nozzle **48** and directly opposite pad **60** on the pad carrier **55**. As the cam shaft **52***a* rotates, cam follower **57** causes the bell crank lever **56***a* to rotate in an anticlockwise direction whereby pad **60** is advanced against the exposed face of the bag **11**. During this displacement the electromagnet **65** is energised and is thereby attracted to the soft iron block **66** causing lever **63** to rotate in a clockwise direction to raise the beak **63***a* to its highest position. The coil spring **62** is holding the bearing bracket **61** in its forwardmost position and the beak **63***a* is therefore in advance of the resilient pad **60**. At this time the operating rod **70** is moved to its extreme right-hand position as shown in FIG. 13 and the rollers **72***c* and **73***c* approach each other to grip the bag at its lower regions. This position is shown in FIG. 2. In the forwardmost position of pad carrier **55**, the electromagnet **65** releases and the lever **63** is rotated anticlockwise under the action of coil spring **64** such that the beak **63***a* enters into the open end of the bag. Cam follower **57** is then rotated by cam **55** in a clockwise direction to retract the pad carrier **55** with its associated parts and, in retracting, the beak **63***a* pulls the exposed wall **11***b* of the bag **11** outwardly from the supporting means causing the mouth of the bag **11** to be opened sufficiently to allow nozzle **48** to enter thereinto. This position is shown in FIG. 3.

Push rod **51** is then advanced by cam **52** and nozzle **48** is lowered into the open mouth of the bag **11** and, when this operation has been completed, the electromagnet **65** is again energised to withdraw the beak **63***a* from engagement with the bag. Cam **58** then allows cam follower **57** to be rotated in an anticlockwise direction to advance pad carrier **55** a second time, the forward displacement in this second movement being greater than in the first and resilient pad **60** engages the exposed wall of the bag to close the open mouth of the bag tightly about the nozzle **48** as shown in FIG. 7. During this second advance of said pad carrier **55**, the beak **63***a* engages the nozzle **48** before the pad carrier **60** has completed its forward displacement and the lever **63**, which is of substantially rigid construction, forces the bearing bracket **61** to be rearwardly displaced relatively to pad carrier **55** against the action of spring **62**.

The nozzle **48** is then connected to the high pressure source and the high pressure gas is discharged from the nozzle **48** into the bag **11** to cause said bag to inflate. As gas is released into the bag **11** through the nozzle **48**, the bag **11** becomes inflated over the region between jaws **32***a*, **33***a*, **35** and rollers **72***c*, **73***c*, rollers **72***c* and **73***c* preventing the pressure gas from entering into the lower regions of the bag **11** and the expansion of the bag **11** continues until the said section intermediate jaws **32***a*, **33***a*, **35** and rollers **72***c*, **73***c* is fully inflated as shown in FIG. 4. The inflation of the said section takes place before any substantial extraction of the lower regions of the bag **11** from between the rollers **72***c*, **73***c*.

It will be appreciated that the inflated section is held at the bag mouth by jaws **32***c*, **33***c*, **35** and at the lower end by rollers **72***c*, **73***c* so that the inflation of said section causes tension forces to develop in the plane faces **11***a*, **11***b* of the bag **11**.

The inflation of the mid section in causing separation of the faces **11***a*, **11***b* also causes the gusseted side walls to open and near the mid region of the inflated section of the bag **11** may be inflated to its maximum section.

The continuous increase in gas pressure in the inflated section causes an increasing build up of tension foces in plane faces **11***a* and **11***b* and eventually the forces in the plane faces **11***a* and **11***b* exceed the force necessary to draw the collapsed lower regions of the bag **11** upwardly from between rollers **72***c* and **73***c* and the lower regions of the bag **11** are thereby drawn upwardly from between rollers.

Under the above conditions, i.e. the controlled release of the lower regions of the bag **11** from the nip of rollers **72***c* and **73***c*, the build up of tension forces in the faces **11***a* and **11***b*, the gas force causing the faces **11***a* and **11***b* to move outwardly and the gusseted side walls **11***c* and **11***d* to be extended, coupled with the formation of the bottom closure of the bag **11**, a folding action takes place at the lower regions of the bag **11** as they are released from the rollers **72***c* and **73***c* to form a block bottom thereby giving the container the shape shown in FIG. 5.

It has been found that during inflation of the bag, the high gas pressure used tends to cause rearward movement of the back jaw **35** and anticlockwise rotation of the lever **35***a* against the tension of the spring **36**. This may cause leakage of gas through the upper end of the bag **11** to prevent this the push rod **80** (FIG. 13) is moved vertically during the inflating operation to compress the spring **80***e* thereby preventing any anticlockwise rotation of the lever **35***a* (FIG. 9) and backward movement of the jaw **35**.

A second embodiment of the invention is shown in FIG. 6 in which the roller **72***c* is rotatably mounted on one end of a bell crank lever **21** pivotally attached near its mid region to a fixed mounting frame member **22** and lever **21** is maintained in a position abutting a fixed frame member **23** by a relatively strong tension spring **24**. The roller **73***c* is rotatably mounted on one arm of a second bell-crank lever **25** which also has a mid-pivotal connection with member **22** and lever **25** has a roller **26** on the end of its lower arm member, roller **26** being engaged in a horizontal guide slot **27** in a block **28** secured to the top of a push rod **29**.

It will be seen that with this arrangement roller **73***c* can be displaced away from the roller **72***c* when the push rod **29** is upwardly displaced to rotate the bell crank lever **25** clockwise as shown in FIG. 6 and when push rod **29** is downwardly displaced bell crank lever **25** is rotated anticlockwise so that roller **73***c* is advanced towards roller **72***c*. The resilient mounting of the roller **16** enables a close control to be effected on the pressure between the rollers and therefore constitutes a control of the internal pressure in the bag **11** necessary to extract the lower regions of the bag **11** from between the rollers **72***c* and **73***c*.

It will be understood that the various operations of the two embodiments shown in FIGS. 6 and 13 take place as part of the timed sequence of the machine as a whole, and apparatus for coordinating the different operations is not described since it is, in general, well known and does not form part of the present invention.

Further while the machine described in our Patent No. 3,112,588 uses semi-rigid material for the tubing, the invention is also applicable to the formation of block-bottom containers using material having non-rigid characteristics.

Many modifications and variations of the invention will be apparent to those skilled in the art and the invention is not restricted to the specific embodiments described and shown but covers all arrangements for forming a bag into a block bottom container by inflating the bag and causing the lower regions thereof to be drawn through a restricted opening by the forces developed in the bag walls during inflation.

I claim:

1. In apparatus for forming a container from a length of gusseted tubing having one end closed, the provision of block bottom forming means comprising support means for supporting the length of gusseted tubing in the region of the upper open end thereof, first and second members for defining a restricted opening in parallel relationship to the flat sides of the length of tubing at the lower regions thereof, through which restricted opening passes the closed end of said length of tubing and means for inflating the length of tubing at the open end thereof to form the container whereby the lower regions of said length of tubing are drawn upwardly through said restricted opening to enable a folding action to take place to give a block bottom to the container so formed.

2. Block bottom forming means as claimed in claim **1**,

wherein said first and second members comprise freely rotatable nylon-covered rollers.

3. Block bottom forming means as claimed in claim 1 wherein said first member comprises a freely rotatable resiliently mounted nylon-covered roller and said second member comprises a freely rotatable nylon-covered roller, means being provided for moving said second-mentioned roller towards said resiliently mounted roller whereby the lower regions of the flat faces of the length of tubing are gripped between the rollers.

4. Block bottom forming means as claimed in claim 1 wherein said first and second members comprise freely-rotatable nylon-covered rollers and means are provided for moving said rollers towards one another whereby the lower regions of the flat faces of the length of tubing are gripped between the rollers.

5. In apparatus for forming a container from a length of gusseted tubing having one end closed, the provision of block bottom forming means comprising support means for supporting the length of gusseted tubing in the region of the upper open end thereof, a pair of freely rotatable rollers positioned in parallel relationship to the flat sides of the length of tubing at the lower regions thereof and adjacent the closed end, means for moving at least one of said rollers to grip the length of tubing and means for inflating the length of tubing at the open end thereof to form the container whereby the lower regions of the length of tubing are drawn upwardly between

the rotatable rollers to enable a folding action to take place to give a block bottom to the container so formed.

6. Block bottom forming means as claimed in claim 5, wherein said rollers are nylon covered.

7. In apparatus for forming a container from a length of gusseted tubing having one end closed, the provision of block bottom forming means comprising support means for supporting the length of gusseted tubing in the region of its upper open edge, a pair of freely rotatable rollers positioned in parallel relationship to the flat sides of the supported length of tubing adjacent the closed end of said length of tubing, means for moving one of said rollers towards the second roller to grip the length of tubing and means for inflating the length of tubing at the open end thereof to form the container whereby the lower regions of the length of tubing are drawn upwardly between the rotatable rollers to enable a folding action to take place to give a block bottom to the container so formed.

8. Block bottom forming means as claimed in claim 7, wherein said rollers are nylon covered.

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