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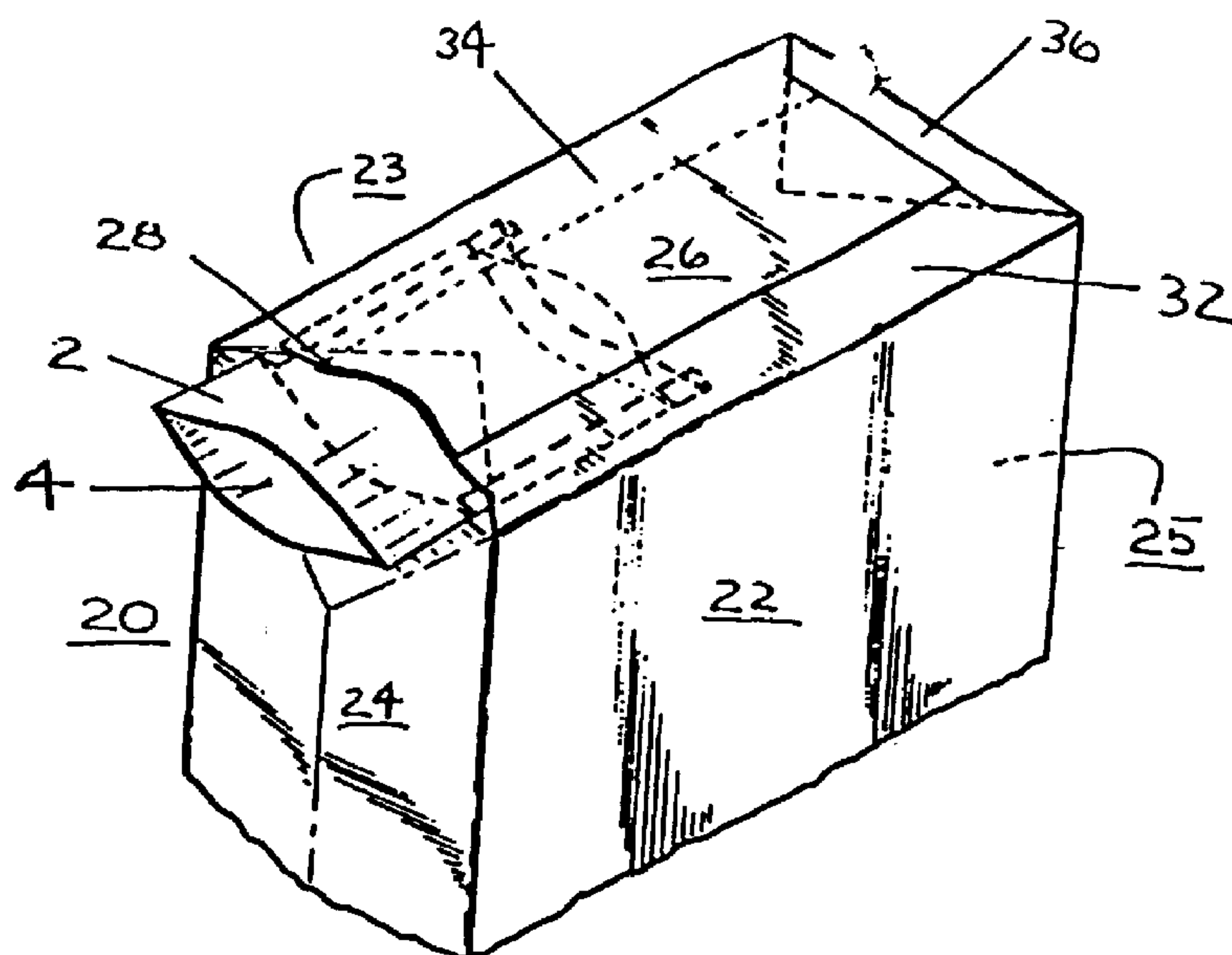
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(54) **FERMETURE A VALVE ACOUSTIQUE POUR SACS A VALVE**

(54) **SONIC VALVE CLOSURE ASSEMBLY FOR VALVE BAGS**



(57) The present invention is a valve bag with a valve assembly that provides closure during and after the filling process, thus preventing unwanted spilling and sifting of the valve bag contents through the valve opening during transporting or moving the bag to a location in which the valve is permanently sealed, and methods for making and filling such a bag.

Abstract of the Disclosure

The present invention is a valve bag with a valve assembly that provides closure during and after the filling process, thus preventing unwanted spilling and sifting of the valve bag contents through the valve opening during transporting or moving the bag to a location in which the valve is permanently sealed, and methods for making and filling such a bag.

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

SONIC VALVE CLOSURE ASSEMBLY FOR VALVE BAGS**Background of the Invention**

The present invention relates to valve bags that feature a self-closing valve which closes in response to pressure from the contents of the bag after filling. The contents are typically a powdered or granular medium. A valve bag is a container made with one or more tubular plies of material, the material usually being a rigid paper such as kraft paper. Typically, the valve bag ends are formed by cutting and folding the plies, thereby forming flaps on the long sides of the bag end. Flaps are also formed on the short sides of the bag end. The short flaps are folded inward and the long flaps are folded over each other on top of the short flaps, thus forming the end of the bag. These flaps may be glued or bonded together to seal the end of the bag. The bag is usually folded to form corner tucks extending from both short sides of the bag end resulting in a satchel-type rectangular configuration. These corner tucks may be folded inward from the sides of the bag. When the bag is filled, these corner tucks unfold and cause the bag

end, top or bottom, to take the rectangular shape. This type of bag is usually called a satchel bag.

A valve bag is most often a satchel bag which features a channel formed on one of the short sides of the filling end of the bag. This channel is typically a flattened tube which is inserted during bag manufacturing on one side of the bag end before the flaps are folded and sealed together. The channel may also be formed by leaving the two flaps on the long side of the bag end unsealed to the flap on the short side. The channel and the length of the flap on the short side form a passage, which allows access to the interior of the bag for filling it with contents. The folded short side flap may extend further into the bag than the channel, such as that disclosed in Kelley et al., U.S. Pat. No. 5,516,210, thus providing a closure or shutoff for the valve. The valve is closed by the contents of the bag pushing this flap against the sealed long side flaps of the bag end. When the prior art valves are closed, the contents of the bag are supposed to be prevented from sifting out of the channel. Thus, there is no need to immediately heat or sonically seal the bag after it is filled. This allows the bag to be sealed immediately or at another location on the production line in the filling process of the bag user.

The main goal of prior art sealable valve bags has been to prevent the sifting or leakage of the bag contents back through the channel of the valve after filling. This goal was addressed by the initial mechanical closing or sealing of the valve in order to prevent such sifting or leaking. Known sealable valve bags have utilized a valve formed from a flattened tube. This tube usually extends outward from the short side of the bag end in order to provide an adequate length of material for the sealing process. For the final sealing closure,

the inner surface of the tube is typically coated with an adhesive or other sealing material, which may be activated by heat, pressure, or ultrasonic means. Other valve bag constructions rely on hot melt glue to provide a final seal to the valve. When the packer is ready, valve bags are filled by means of a filling nozzle which is inserted into the valve channel. When the bag is full, the nozzle is removed and the valve opening is then ready to be finally sealed.

While some of the sifting problems have been prevented by these previously used sealable valve bags, they still have limitations inherent in their structure. Sifting and spillage may yet occur when the filling nozzle is removed. This is partially due to the memory of the rigid valve material after removal of the nozzle. Prior art bags which were to be finally sealed at a remote location down the manufacturing line, distant from the filling point, spilled out product between these two stages of the process. Even valve bags which have had an extended short side flap in order to close off the valve channel, nonetheless have still allowed sifting around the sides of this flap, resulting in spillage through the valve opening during transport to the final sealing station. This spillage also affects the seal quality by contaminating any opposing sealing surfaces prior to the sealing process. Furthermore, since the prior art valve constructions have typically utilized only the plies of the bag to support the valve tube, they have been susceptible to tears or damage during the filling process.

It is therefore an object of the present invention to provide a sealable valve bag assembly, which upon filling, immediately creates a mechanical seal lock along the standard parallel fold lines of a satchel-type bag end at the bag-inward opening of the valve tube, thereby sealing both sides of the valve tube in the fold lines and eliminating any possible

channeling of the bag contents through and alongside the valve tube prior to a final sealing step.

It is a further object of the present invention to provide a seal tab lock which extends beyond the innermost edge of the short side flap of the bag, thus creating a flap valve which purposely prevents filled product from escaping back out the valve tube before the valve is ultimately sealed by heat, sonic, pressure, adhesive means, or the like.

It is still another object of the present invention to provide a seal tab lock which is attached to the valve bag assembly, but not formed from the valve bag plies, thus adding strength and support to the valve side of the bag end in order to prevent tears or ruptures in the valve area during and after the filling operation.

Summary of the Invention

The present invention is a valve closure assembly, preferably sonically sealable, for use in valve bags. The valve bag is a container formed from tubular-shaped plies of material, the ends of the bag being formed by cutting the bag material at the corners of the bag end and folding short sides of the bag end inward, thus creating two flaps along long sides of the bag end. A seal tab lock is disposed and affixed on one of the short sides of the bag end where the valve will be located, the seal tab lock also being positioned over the parallel fold lines of the long side flaps of the bag end and extending past both fold lines by an equal length. The seal tab lock is also positioned so that it extends over the inner edge of the longest corner enfold of the short side of the bag end. A valve tube is disposed and affixed over the seal tab lock and offset by a predetermined distance so that the seal tab lock extends

further into the inner portion of the bag than the inside end of the valve tube. This offset also results in the valve tube extending outwardly from the short side of the bag end. The long side flaps on the bag end are then folded over each other at the parallel fold lines and sealed so that the bag end is formed with the valve tube exposed from one side of the bag end.

Upon filling the bag with the intended product, the seal tab lock, which is affixed to the short side of the bag end before the valve tube is affixed, and also before the long side flaps are folded inward and sealed, forms a barrier around the sides of the inner valve tube end and a mechanical closure for the valve tube inside the bag. The side barrier is formed by extended portions of the seal tab lock inside the bag and along the parallel folds formed by the long side flaps on the bag end. When the long side flaps are folded inward, the extended portions are also folded over, thus creating the seal lock. The offset positioning of the valve tube in relation to the seal tab lock results in the seal tab lock extending further into the bag than the inner valve tube opening, thereby creating a flap valve closure action, which effects a valve tube closure prior to sealing.

In a preferred embodiment of the invention, the width of the seal tab lock equals the width of the valve size specified plus one inch for use with a full width valve. A seal tab lock may also be specified for a reduced valve by providing a wider seal tab lock. Preferably, the width of the seal tab lock will allow enough material to fold over the valve tube in order to create seal tabs along the sides of the valve tube. The valve tube material is preferably a heavy paper, or other rigid material, which allows for easy insertion of a filling nozzle. The heavy paper also prevents tearing or damage to the valve tube during or after the filling

process. The inside surface of the valve tube is preferably pre-coated with a sealable material to allow sealing of the valve tube by heat, sonic, pressure, adhesive means, or an equivalent.

Brief Description of the Drawings

FIG. 1 is a perspective view of a satchel end of an assembled multiple ply valve bag at the bag end having the valve assembly.

FIG. 1A is a perspective view showing the valve assembly removed from the valve bag.

FIG. 2 is a plan view of the unassembled valve bag end of FIG. 1 showing the long side flaps of the multiple bag plies formed by cutting the corners of the valve bag and the short side flaps of the multiple bag plies folded inwardly.

FIG. 3 is a plan view of the bag end having the valve assembly showing the assembly placement step for the seal tab lock shown exploded away and in dashed lines with respect to the flaps and parallel fold lines of the bag end.

FIG. 4 is a plan view of the bag end having the valve assembly showing the assembly placement step for the sonic valve tube shown exploded away and in dashed lines with respect to the seal tab lock and the parallel fold lines of the bag end.

FIG. 5 is a plan view of the bag end having the valve assembly showing a full width valve assembly shown prior to the folding of the long side flaps of the bag end.

FIG. 6 is a plan view of the bag end similar to FIG. 5 and having a valve assembly in an alternate embodiment for a reduced size valve assembly shown prior to the folding of the long side flaps of the bag end.

FIG. 7 is a plan view of an entire assembled valve bag with a full width valve assembly.

FIG. 8 is a plan view of an entire assembled valve bag with a reduced width valve assembly.

FIG. 9 is a cross-sectional side view of the bag end at the valve assembly before filling.

FIG. 10 is a cross-sectional side view of the bag end at the valve assembly during filling by the filling nozzle inserted into the valve.

FIG. 11 is a cross-sectional side view of the bag end at the valve assembly showing a filled valve bag and sonic sealing apparatus for sealing the valve closed.

FIG. 12 is a perspective view of a satchel end of an assembled multiple ply valve bag at the bag end having an alternate embodiment of the valve assembly.

FIG. 12A is a perspective view showing the alternate embodiment of the valve assembly of FIG. 12 removed from the valve bag.

FIG. 13 is a plan view of the bag end having the alternate embodiment of the valve assembly of FIG. 12 showing the assembly placement step for the seal tab lock shown exploded away and in dashed lines with respect to the flaps and parallel fold lines of the bag end.

FIG. 14 is a plan view of the bag end having the alternate embodiment of the valve assembly of FIG. 12 showing the assembly placement step for the sonic valve tube shown exploded away and in dashed lines with respect to the seal tab lock and the parallel fold lines of the bag end.

FIG. 15 is a plan view of the bag end having the alternate embodiment of the valve assembly of FIG. 12 showing the valve assembly prior to the folding of the long side flaps of the bag end.

FIG. 16 is a perspective view of a satchel end of an assembled multiple ply valve bag at the bag end having another alternate embodiment of the valve assembly.

FIG. 16A is a perspective view showing the alternate embodiment of the valve assembly of FIG. 16 removed from the valve bag.

FIG. 17 is a plan view of the bag end having the alternate embodiment of the valve assembly of FIG. 16 showing the assembly placement step for the seal tab lock shown exploded away and in dashed lines with respect to the flaps and parallel fold lines of the bag end.

FIG. 18 is a plan view of the bag end having the alternate embodiment of the valve assembly of FIG. 16 showing the assembly placement step for the sonic valve tube shown exploded away and in dashed lines with respect to the seal tab lock and the parallel fold lines of the bag end.

FIG. 19 is a plan view of the bag end having the alternate embodiment of the valve assembly of FIG. 16 showing the valve assembly prior to the folding of the long side flaps of the bag end.

FIG. 20 is a perspective view of a satchel end of an assembled multiple ply valve bag at the bag end having another alternate embodiment of the valve assembly.

FIG. 20A is a perspective view showing the alternate embodiment of the valve assembly of Fig. 20 removed from the valve bag.

FIG. 20B is a perspective view of the alternate embodiment of the valve assembly of Fig. 20 with the flap valve unfolded.

FIG. 21 is a perspective view of a satchel end of an assembled multiple ply valve bag at the bag end having another alternate embodiment of the valve assembly.

FIG. 21A is a perspective view showing the alternate embodiment of the valve assembly of Fig. 20 removed from the valve bag.

FIG. 21B is an exploded view of the alternate embodiment of the valve assembly of Fig. 20 with the flap valve unfolded.

Detailed Description of the Invention

A typical valve bag 20 has a tubular configuration with long sides 22 and 23, and short sides 24 and 25, as shown in FIG. 1. For simplicity of illustration, only one bag end 26 with a valve assembly 10 is shown. After final assembly of the valve bag 20, a valve tube 2 extends from the valve side 28 of the bag end 26 and provides a valve channel 4 in order to access the inside of the valve bag 20. The valve bag 20 is usually constructed with one or more paper plies A, B, and C, and is provided with a step pattern 60 at the bag end 26 as illustrated in FIG. 2.

The first step of the sonic valve bag construction depicted in FIG. 2 is to cut the paper plies A, B, and C of the bag end 26, thus creating cut lines 52, 54, and 56. The step pattern 60 is exposed at the short sides 24 and 25 of the bag end 26 by cutting away a portion of the bag ply A, also as shown in FIG. 2. Short side flaps 36 and 38 are folded inward, creating fold lines 42 at the short sides 24 and 25 of the bag end 26 and also creating flaps 32 and 34

along the long sides **22** and **23** of the bag end **26**. Parallel fold lines **40** are created to allow the flaps **32** and **34** to fold inward during the final assembly. This construction creates a known type of satchel bag end with outwardly folded gussets **14** and **16** formed by the fold lines **42** at the short sides **24** and **25** of the bag end **26**. When the bag **20** is filled with contents, gussets **14** and **16** unfold and cause the bag end **26** to take a rectangular shape.

A seal tab lock **3** is disposed on the short side flap **38** as shown in **FIG. 3** and is centered upon the fold lines **40**, so that an equal length of the seal tab lock **3** extends over each fold line **40**, thus creating folded-over tab locks **3a** and **3b**. The seal tab lock **3** is further disposed so that an inner edge **3c** extends over an innermost edge **66** of the short side flap **38** by a predetermined distance, this distance being about two inches in the preferred embodiment. This inward extension distance can be longer if the filling nozzle opening **82** shown in **FIG. 10** allows, but preferably is no less than about one and one half inches. The seal tab lock **3** in the preferred embodiment is a 50 pound super (high) performance kraft (SPK) paper. The seal tab lock **3** may be formed from the same material as the plies of the bag **20**.

A valve tube **2** is then disposed on the seal tab lock **3** and positioned such that the valve tube **2** is offset toward the valve side **28** by a predetermined distance, allowing the inner portion of the seal tab lock **3** to extend past the inner opening **6** of the valve tube **2** and creating a flap valve **9** portion of the seal tab lock **3**, as shown in **FIG. 4**. The offset distance in the preferred embodiment is one quarter inch towards the valve side **28** from the innermost edge **66** of the short side flap **38**, plus or minus one quarter inch. The length of the valve tube **2** is dictated by the satchel size of the valve bag **20** and the sealing equipment requirements.

The material of the valve tube 2 is preferably a heavy paper, or other rigid material, such as a 70 pound natural kraft paper, or equivalent. An example of a suitable alternative material for the valve tube 2 is 60 pound bleached white kraft paper. The invention is not limited to forming the valve tube 2 or the seal tab lock 3 only from paper as other suitable materials are envisioned, including plastic polymers.

An inside surface 1 of the valve tube 2 is coated with a special blend of coatings for use in the sealing process. The preferred coating for ultrasonic sealing is polyethylene applied in the proportion of about 40 to 50 pounds of coating per ream of paper. The preferred formulation for the polyethylene coating has the proportion of about 40% +/- 5% by weight of low density polyethylene with metallocene and about 60% +/- 5% by weight of high density polyethylene. The coating may also include an anti-static ingredient. An example of a suitable alternative coating is #1652 slip additive resin, sold under the brand name SURLYN by E. I. DuPont deNemours Chemical Company. To prevent curling, the outer surface of the seal tube may be coated with an anti-curling coating. Other coatings may be used for different sealing processes. The valve tube 2 may be coated with other equivalent sealing compositions that may be alternatively sealed through heat, adhesive, or pressure means, as would be understood by those skilled in the art.

FIG. 5 shows the seal tab lock 3 and the valve tube 2 affixed to the short side flap 38 of the bag end 26.

FIG. 6 shows the seal tab lock 3 and the valve tube 2 formed in different dimensions, affixed to the short side flap 38 of the bag end 26, thereby forming a reduced size alternate embodiment of the valve assembly 10. The width of the seal tab lock 3 for a full width valve

in the exemplary embodiment is determined by adding one inch to the width of the valve tube 2. For standard 40-60 pound capacity paper valve bags, the full width valve manufacturing range is from about three to about nine inches. The width of the seal tab lock 3 for a reduced valve in the disclosed embodiment is determined by adding the width of the bag end 26 to the difference between the width of the bag end 26 and the width of the specified reduced valve tube 2, plus one inch. The extra width in this formula is for the purpose of providing enough material for the seal tab lock 3 to cover widest gaps 12 between sides 7 and 8 of the valve tube 2 and the parallel fold lines 40, as shown in FIG. 6. The reduced valves have a manufacturing range from about three to about eight and three quarter inches for the disclosed alternate embodiment.

In the final steps of assembly, the flap 32 is folded inward over the valve tube 2 and the flap 34 is folded over the flap 32 along the fold lines 40, thereby resulting in the tab locks 3a and 3b of the seal tab lock 3 being folded around and on top of the valve tube 2, as shown in FIG. 1. FIG. 1A shows an isolated view of the assembled valve tube 2 and seal tab lock 3 showing the tab locks 3a and 3b of the seal tab lock 3 folded around the valve tube 2. In the preferred embodiment, the tab locks 3a and 3b are integrally joined to the side edges of the seal tab lock 3 and wrap around or over the top of the valve tube 2 for one half inch margins along each side. This provides a complete seal under the valve tube 2 and along the parallel fold lines 40, leaving no channel for the contents to leak out. The flap 34 is then sealed to the flap 32, preferably by pasting, as is known in the bag-making arts, to complete the assembly. The tab locks 3a and 3b create a seal around the inner opening of the valve

tube 2 which, along with the flap valve 9, prevent outward channeling or sifting of the contents of the valve bag 20 during and after the filling process.

FIG. 7 and **FIG. 8** are plan views of the preferred embodiments for the final assemblies of the full width valve version and the alternate reduced valve version of the valve bag 20, respectively.

FIG. 9 is a vertical cross-section taken at the valve side 28 of an assembled empty valve bag 20 ready to be filled. The cross-section reveals the paper plies A, B, and C of the valve bag 20, however the invention is not limited to bags having three plies. The valve tube 2 is shown in a closed but unsealed position with the flap valve 9 of the seal tab lock 3 in an open position. The valve bag 20 is filled by inserting a filling nozzle 80 into the valve channel 4 of the valve tube 2, expanding it open, as shown in **FIG. 10**. The filling nozzle 80 extends past both the inner opening 6 of the valve tube 2 and an inner edge 5 of the flap valve 9. The valve bag 20 is then filled with contents 100, which would typically be a granular, powdered, or comminuted product, such as dry powdered milk. As the contents 100 inside the valve bag 20 reach the filling nozzle 80, they push flap valve 9 towards the inner surface of the bag end 26. When filling is complete and the filling nozzle 80 is removed, the pressure from the contents 100 of the valve bag 20 forces the flap valve 9 and the tab locks 3a and 3b against the inner surface 29 of the bag end 26, thereby providing a mechanical closure or shutoff of the inner opening 6 of the valve tube 2. The valve tube 2 is also flattened against the inner surface 29 of the bag end 26 from the pressure of the contents. When the filling nozzle 80 is removed, the tab locks 3a and 3b of the flap valve 9 prevent the contents from channeling or leaking around the flap valve 9 and sifting back

outwardly of the valve channel 4 of the valve tube 2, thus providing an effective closure between the sides 7 and 8 of the valve tube 2 and the inside of the valve bag 20 prior to final sealing of the valve tube 2.

In the disclosed embodiment, the final sealing is illustrated in **FIG. 11** and comprises a sonic sealing process performed by a sealing apparatus 70 located on the manufacturing line. The valve bag 20 can be transported to the sealing apparatus 70 via a conveyor system. Sifting and spillage of the contents of valve bag 20 are prevented during the transfer to the sealing apparatus by the function of the tab locks 3a and 3b and the flap valve 9 as described. The prevention of such spillage allows bags from several filling lines to be transported to distant sealing apparatus stations or other handling procedures. This eliminates the requirement of having a sealing apparatus on each filling line. The sonic sealing of the valve bag 20 may be performed by a typical sealing apparatus 70, such as generator head 72 and anvil 74 shown in **FIG. 11**. The valve tube 2 extends outwardly from the valve side 28 allowing ample material for the valve tube 2 to be sealed by the sealing apparatus 70 alongside the valve bag 20, as also depicted in **FIG. 11**.

FIG. 12 shows the assembled valve bag 20 having an alternate embodiment valve assembly 110. **FIG. 12A** is an isolated view of the valve assembly 110 showing tab locks 103a, 103b, 103g, and 103h folded around a valve tube 102. In this embodiment, a seal tab lock 103 is folded under itself along an outside edge 103d of the seal tab lock 103 prior to being disposed on the bag 20, thus forming folded portion 103e and leading edge 103f, as shown in **FIG. 13**. The folded portion 103e and the tab locks 103g and 103h provide a second, or double, barrier to prevent sifting of material between the folded flaps 32 and 34

of the valve bag 20 and the seal tab locks 103a and 103b of the valve assembly 110, as well as possible sifting between the seal tab lock 103 and the short side flap 38. The tab locks 103g and 103h of the folded portion 103e also provide added strength to the tab locks 103a and 103b in order to help prevent tearing during the filling and sealing process.

The valve assembly 110 is assembled and attached to the valve bag 20 in much the same way as the other valve assemblies disclosed herein. The seal tab lock 103 with folded portion 103e is disposed on the short side flap 38 and is centered upon the fold lines 40, so that an equal length of the seal tab lock 103 extends over each fold line 40, thus creating folded-over tab locks 103a, 103b, 103g, and 103h, as shown in FIG. 13. The seal tab lock 103 is further disposed so that an inner edge 103c extends over an innermost edge 66 of the short side flap 38 by a predetermined distance, this distance being about two inches in the preferred embodiment. This inward extension distance can be longer if the filling nozzle opening 82 shown in FIG. 10 allows, but preferably is no less than about one and one half inches. The valve tube 102 is then disposed on the seal tab lock 103 and positioned such that the valve tube 102 is offset toward the valve side 28 by a predetermined distance, allowing the inner portion of the seal tab lock 103 to extend past the inner opening 106 of the valve tube 102 and creating a flap valve portion 109 of the seal tab lock 103, as shown in FIGs. 12A, 14 and 15.

FIG. 16 shows the assembled valve bag 20 having yet another alternate embodiment valve assembly 210. The valve assembly 210 utilizes a two-piece seal tab lock configuration 200 consisting of a main layer 203, typically made of paper, and an offset layer 205, typically made of a thin plastic film. The main layer 203 and the offset layer 205 of the two-

piece seal tab lock 200 have tab locks 203a, 203b and 205a, 205b, respectively, folded around a valve tube 202 in FIG. 16A. FIG. 17 further shows the main layer 203 and the offset layer 205 to additionally have tab locks 203g, 203h, and 205g, 205h, respectively, of the two-piece seal tab lock 200. In this embodiment, the offset layer 205 is positioned such that an inner edge 205c of the offset layer 205 overlaps an inner edge 203c of the main layer 203 of the two-piece seal tab lock 200. This overlap creates a two-layer flap valve 209 up to the inner edge 203c and a single layer therepast at 209' comprising the offset layer 205 alone. Typically the offset layer 205 is made of a thin plastic film which provides aid in sealing off the valve when product pressure forces the flap valve 209 and 209' closed. When filling is complete, the pressure from the contents of the valve bag 20 forces the flap valve 209 and 209' against the inner surface of the bag end 26, thereby providing a mechanical closure or shutoff of the inner opening 206 of the valve tube 202. The thin plastic film of the offset layer 205 is very limp and provides for a well-sealed shutoff.

Both the offset layer 205 and the main layer 203 are folded over along their outside edges 203d and 205d prior to being disposed on the valve bag 20, thus forming folded portions 203e and 205e, and leading edges 203f and 205f, as shown in FIG. 17. These portions are first folded over the top of the two-layer seal tab lock 200, unlike the seal tab lock 110 in FIG. 12A where the folded portion 103e is first folded under the tab lock 110. Thus, the folded portion 205e of the thin plastic film is captured by the folded portion 203e of paper. The folded portions 203e and 205e and the tab locks 203g, 203h, 205g, and 205h provide a second, or double, barrier to prevent sifting of material between the folded flaps 32 and 34 of the valve bag 20 and the tab locks 203a, 203b, 205a, and 205b of the valve

assembly **210**, as well as preventing sifting between the seal tab lock **203** and the short side flap **38**. The tab locks **203g**, **203h**, **205g**, and **205h** of the folded portions **203e** and **205e** also provide added strength to the tab locks **203a**, **203b**, **205a**, and **205b** in order to help prevent tearing during the filling and sealing process.

The two-piece seal tab lock **200** with the folded portions **203e** and **205e** is disposed on the short side flap **38** as shown in **FIG. 17** and is centered upon the fold lines **40**, so that an equal length of the two-piece seal tab lock configuration **200** extends over each fold line **40**, thus creating the folded-over tab locks **203a**, **203b**, **203g**, **203h**, **205a**, **205b**, **205g**, and **205h**. The two-piece seal tab lock **200** is further disposed so that an inner edge **205c** extends over an innermost edge **66** of the short side flap **38** by a predetermined distance, this distance being about two inches in the preferred embodiment. This inward extension distance can be longer if the filling nozzle opening **82** shown in **FIG. 10** allows, but preferably is no less than about one and one half inches. The valve tube **202** is then disposed on the two-piece seal tab lock **200** and positioned such that the valve tube **202** is offset toward the valve side **28** by a predetermined distance, allowing the inner portion of the two-piece seal tab lock **200** to extend past the inner opening **206** of the valve tube **202**, thus forming the two-piece flap valve **209**, as shown in **FIGs. 16A, 18 and 19**.

FIGs. 20, 20A and 20B provide another alternate embodiment at a valve assembly **310** used in connection with the same construction for a valve bag **20** having long sides **22**, **23**, a bag end **26** and a valve side **28** where a short side **24** meets the bag end **26**. The configuration for the valve bag **20** provides a satchel-like bag end **26** formed by folded longer flaps **32**, **34** and short side flaps **36**, **38**.

In **FIG. 20**, the assembled valve bag **20** and valve assembly **310** are illustrated. The valve assembly **310** will be seen to comprise a valve tube **302** and seal lock **303**. An inside surface **301** of the valve tube **302** is coated as in the embodiment of **FIG. 1** for sonic sealing. The valve assembly **310** is related to the valve assembly **110** of **FIG. 12**. The seal lock **303** corresponds to seal tab lock **103** of **FIG. 12**, but the seal lock **303** provides a circumferentially enclosing sleeve-like wrapping configuration peripherally encircling the exterior of the valve tube **302** as will be explained in greater detail below. The seal tab lock **103** does not wrap fully around the valve tube **102**.

The seal lock **303** includes tab locks **303a**, **303b**, **303g** and **303h** that are folded around outside edges of **307**, **308** of the valve tube **302** to circumferentially surround valve tube **302**. An inner edge **303c** extends bag inwardly from an inward opening **306** of the valve tube **302** as best seen in **FIG. 20B**. An outer edge **303d** is generally coterminous with the valve side **28** of the valve bag **20** shown in **FIG. 20**. The seal lock **303** is folded over at a folded portion **303e** to form a leading edge **303f** bag inwardly of the valve side **28** thereby forming the tab locks **303g** and **303h**, which are double layers created by the folded portion **303e**. The remaining bag-inwardly portions of the seal lock **303** form the tab locks **303a** and **303b**, as shown in **FIGs. 20A** and **20B**.

Broken lines **F** and **FF** in **FIG. 20B** illustrate the generally corresponding locations of the fold lines **40** of the valve bag **20**. The seal lock **303** extends laterally from both of the lines **F** and **FF** a sufficient distance **L** in opposite directions, so that upon the folding of the valve bag **20** to create the satchel-like bag end **26**, the tab locks **303a** and **303h** overlap the tab locks **303b** and **303h** at a dimension **O**, as shown in **FIG. 20A**. In the preferred

embodiment showing a bag end 26 in a standard eight inch width, the overlap is from about one-half inch to one and one-half inches. An adhesive, preferably starch glue, is used to join the seal lock 303 along the overlap O to laterally provide a complete circumferential wrap around the valve tube 302 with the folded portion 303e forming a full pocket for trapping product to prevent leakage.

The valve tube 302 provides an outwardly opening valve channel 304, which extends bag- outwardly from the valve side 28 so that the inner coated surface 301 may be sonically sealed to completely seal the valve tube 302 closed after the valve bag 20 is filled with product. The valve tube 302 has an inner opening 306 for the product to pass through into the interior of the valve bag 20.

The overlapping of the tab locks 303a and 303g over the tab locks 303b and 303h, respectively, provides this complete trapping pocket-like structure as formed by the folded portion of 303e to further enhance the anti-sifting capability of the valve assembly 310 beyond the performance of the configuration of the valve assembly 110. The seal lock 303 extends from the inward opening 306 of the valve tube 303 at a distance, which creates a flap valve 309 caused by offsetting the inner edge 303c of the seal lock 303 from the inner opening 306 of the valve tube 302. Because of the complete wrapping around the valve tube 302, as best illustrated in FIG. 20A, the flap valve at 309 has double layers of paper to thereby further improve the sealing of the product inside the bag and preventing unwanted entry backward into the valve tube 302 through its inner opening 306 after a filling nozzle is withdrawn. The anti-sifting properties are accordingly improved.

The method of assembling the valve assembly 310 with the valve bag 20 is substantially similar to what is shown for the assembly of the valve assembly 110 in FIGS. 13 and 14, except that upon the folding of the bag flaps 32, 34, 36 and 38, the seal lock 303 fully wraps around the valve tube 302 as discussed above, whereas there is a gap between the tab locks 103a, 103g, and tab locks 103b, 103h for the valve assembly 110, best viewed in FIG. 12A.

Similar to the valve assembly 110, the seal lock 303 of the valve assembly 310 is also disposed so that said inner edge 303c extends past an inner most edge 66 (FIG. 13) of the short side flap 38 by a predetermined distance, which in the illustrative embodiment is approximately two inches. This inward extension can be varied, commensurate with the location of the filling nozzle opening 82, to be at least at, but preferably past, the inner most edge 66 of the short side flap 38.

FIGs. 21, 21A and 21B show yet another alternate embodiment for a valve assembly in connection with the valve bag 20. In these figures, a valve assembly 410 is disclosed which is related to the structure of the previously described valve assembly 310. The valve assembly 410 further includes the provision of a third valve assembly member comprising an offset plastic layer 405, which in the preferred embodiment is thin film polyethylene. The relationship of a valve tube 402 to a seal lock 403 is quite similar to that of the valve tube 302 and the seal lock 303. The major difference is that within the pocket created by the folded over portion of 405e, there is the positioning and capturing of the offset layer 405 in order to add additional improved anti-sifting capability for the valve bag 20. The seal lock 403 correspondently includes tab locks 403a, 403g, and 403b, 403h at either side of the valve

tube 402, which also wrap around the valve tube 402 when folding the bag flaps around the bag fold lines 40 (FIG. 4), shown again by corresponding lines F and FF in FIG. 21B. The seal lock 403 includes an inner edge 403c, an outer edge 403d, and another inner edge 403f, created by the folding of a folded portion 403e. The tab locks 403a, 403b and tab locks 403g, 403h generally correspond to the tab locks 303a and 303b, and tab locks 303g and 303h except that the folded portions 303e and 403e are folded in opposite rotational orientations. It will be observed in comparing FIGs. 20B and 21B, that the tab locks 403g and 403h contact the valve tube 402, whereas by virtue of the opposite folding of the folded portion 303e in FIG. 20B the tab locks 303g and 303h are folded onto the opposite side of the seal lock 303 and as a result are on the other side of the seal lock 303 and do not contact the valve tube 302. Accordingly, the rotations to create the tab locks 303g and 303h compared to the tab locks 403g and 403h are the reverse of each other.

In further reference to FIGs. 21A and 21B, the creation of the folded portion 405e provides a pocket for the retention or capture of a portion of the offset layer 405. The offset layer 405 provides opposing tab locks 405a and 405b, an inner edge 405c, and an outer edge 405d. A folded portion 405e extends bag inwardly from the outside edge 405d and forms tab locks 405g and 405h folded in the same direction as the tab locks 403g and 403h. The tab locks 405g and 405h are nested within the pocket-like folded portion 403e. In the disclosed embodiment, the folded portion 403e is approximately twice the length of the folded portion 405e. Said inner, or leading, edge 403f of the seal lock 403 thus projects farther bag-inwardly than an inner leading edge 405f of the offset layer 405, but stops short of projecting to an inner opening 406 of the valve tube 402, as best seen in FIG. 21B. Both

the seal lock 403 and offset layer 405 overlap themselves and have a lateral dimension whereby to extend distances L to either side of the fold lines F and FF in order to form an overlap O for the seal lock 403 and an overlap O' for the offset layer 405, as viewed in FIG. 21A. For a standard width eight inch wide bag, this overlaps O and O' are from about one-half to one and one-half inches. As in the embodiment for the valve assembly 310, an adhesive, which is preferably a starch glue, joins the seal lock 403 along the overlap O and traps the offset layer 405 within the folded portion 403e. In the preferred embodiment, the main and offset layers have substantially the same width whereby 403d, 405d and 403c, 405c, are substantially of equal length. In order to prevent a slippage of the thin plastic film comprising the offset layer 405, the offset layer 405 is shifted, or stepped, shown at S to displace its outside lateral edge 405i a short distance from an outside edge 403i of the seal lock 403, as shown in FIG. 21B. This shift, or stepping, S provides a small stepped-out part of the offset layer 405 relative to seal lock 403 to allow the adhesive to come into contact with the offset plastic layer 405 along the overlap O and O' and secure it to the paper seal lock 403. The stepping S is preferably from about 1/16 to 3/8 inch. The stepping S could either be leftwardly or rightwardly (as shown) the unfolded arrangement shown in FIG. 21B, as would be understood by one skilled in the art.

A two member flap valve 409 and a single member flap valve 419 are created by the inward offsetting of the seal lock 403 and offset layer 405 from the inner opening 406 of the valve tube 402. Specifically, in reference to FIGs. 20 and 21A, it will be seen that for the flap valve 409 of the seal lock 403, the product inside the valve bag 20 will push upward against both the seal lock 403 and offset layer 405. From the inner edge 403c of the seal lock

403 to the inner edge 405c of the offset layer 405, only a single member, the plastic offset layer 405, would be compressed by the product as it fills within the bag 20. At the flap valve 409, there will be four layers of material pressed together: (one and two) the portions of the seal lock 403 above and below the valve tube 402, and (three and four) the portions of the offset layer 405 also above and below the valve tube 402. At the valve flap 419, two layers of material would be pressed together by the force of the product filled within the bag 20: (one) the top portion of the offset layer 405 above the valve tube 402 would be pressed by (two) the portion of the offset layer 405 below the valve tube 402. Thus, a very effective sealing closure of the inner opening 406 of the valve tube 402 is achieved. The folded over portions 403e and 405e form a trapping-like collar and provide additional anti-sifting means for stopping granular products and the like from flowing bag-outwardly around valve tube 402 or channeling outward along its sides 407, 408.

Similar to the valve assembly steps shown in FIGs. 17 and 18, the assembly of the valve assembly 410 and the valve bag 20 is achieved by placing the seal lock 403, with the offset layer 405 pocketed therein, onto the unfolded satchel bottom end 26 of the valve bag 20 and thereafter placing the valve tube 402 thereon, corresponding to the placing of the valve tube 202 in FIG. 18. The seal lock 403 and offset layer 405 are then folded with the bag flaps at fold lines 40, corresponding to the lines F and FF as shown in FIG. 21B, whereupon a starch glue adhesive, or the like, adheres the valve bag 20 and the valve assembly 410 together. The valve tube 402 likewise provides a valve channel 404 for insertion of a nozzle 80 for the introduction of product into the valve bag 20. The valve tube 402 extends bag-outwardly from the valve side 28 a sufficient distance for sonic welding, as

in FIG. 11. An inner surface 401 of the valve tube 402 is coated, like the embodiments previously described, for sonically sealing the valve tube 402. The combination of the offset layer 405 and the seal lock 403 provides very effective anti-sifting properties to prevent product from leaving the bag after the step of filling has been completed.

While specific embodiments of the present invention have been shown here for the purposes of explaining preferred and alternate embodiments of the invention, it is to be understood that the appended claims have a wide range of equivalents and a broader scope than the embodiments disclosed.

Claims

What is claimed is:

1. A valve bag assembly comprising:

a tubular bag body having a valve end including a valve side, an interior portion and exterior surface; and,

a valve having:

a valve tube having an inner opening end and outer opening, an interior surface and exterior surface; said valve tube disposed at said valve side of said valve end of said tubular bag body, the inner opening extending into the interior portion of said tubular bag body and the outer opening extending outward of the exterior surface of said tubular valve bag, said valve tube providing a channel into the interior portion of said valve bag; and,

a flap valve having an inner edge, an outer edge, and at least two oppositely folding tab locks, said outer edge formed by folding a portion of said flap valve member onto itself, said flap valve member disposed at said valve side of the tubular bag body between said tubular bag body and the exterior surface of said valve tube, the inner edge of said flap valve member extending past the inner opening of said valve tube, and the two tab locks being folded over the valve tube a sufficient distance to overlap, whereby the flap valve provides a sleeve-like wrapping, whereby said flap valve accommodates the valve tube within said sleeve-like wrapping.

2. The valve bag assembly according to claim 1, wherein said valve tube is made of natural kraft paper.

3. The valve bag assembly according to claim 2, wherein the weight range of said natural kraft paper is from about 60 to 70 pounds.
4. The valve bag assembly according to claim 1, wherein said valve tube further comprises an interior surface coating disposed on said interior surface.
5. The valve bag assembly according to claim 4, wherein said interior surface coating includes an anti-static ingredient.
6. The valve bag assembly according to claim 5, wherein said interior surface coating is capable of being sonically sealed.
7. The valve bag assembly according to claim 5, wherein said interior surface coating is polyethylene.
8. The valve bag assembly according to claim 7, wherein said polyethylene has a formulation with about 40% +/- 5% low density polyethylene with metallocene and about 60% +/- 5% high density polyethylene.
9. The valve bag assembly according to claim 1, wherein the tab locks overlap each other in a range of from about one-half to one and one-half inches.

10. The valve bag assembly according to claim 1, wherein said valve end includes two parallel fold lines and the tab locks are folded along fold lines corresponding thereto.

11. The valve bag assembly according to claim 1, wherein the width of said valve tube ranges from about three inches to about nine inches.

12. The valve bag assembly according to claim 1, wherein the valve side of the valve bag end includes an outer folded edge and an innermost edge of a bag flap, and the distance between the inner edge and the outer folded edge of said flap valve equals the distance between the outer folded edge of the valve end and said innermost edge of said bag flap plus at least about two inches.

13. The valve bag assembly according to claim 1, wherein the valve side of the valve end includes an outer folded edge and an innermost edge of a bag flap, and the distance between the inner edge and the outer folded edge of said flap valve equals the distance between the outer folded edge of the bag and the closest edge an opening of a fill spout insertable into said valve tube for filling the bag with product.

14. A valve bag assembly comprising:

a tubular bag body having a valve end including a valve side, an interior portion and an exterior surface; and

a valve having:

a valve tube having an inner opening, an outer opening, an interior surface and an exterior surface, said valve tube disposed at said valve side of said valve end of said tubular bag body, the inner opening extending into the interior portion of said tubular bag body and the outer opening extending outward of the exterior surface of said tubular valve bag, said valve tube providing a channel into the interior portion of said valve bag; and

a flap valve having a main layer and an offset layer, both layers having an inner edge, an outer edge, and at least two opposite folding tab locks, said offset layer disposed on said main layer such that the inner edge of said offset layer extends past the inner edge of said main layer, said outer edges formed by folding both said main and offset layers of said flap valve, said flap valve disposed at said valve side of the tubular bag body between said tubular bag body and the exterior surface of said valve tube, the inner edge of said offset layer and the inner edge of said main layer extending past the inner opening of said valve tube, and the at least two tab locks of both said main and offset layers being folded over the valve tube a sufficient distance to overlap, whereby the flap valve provides a sleeve-like wrapping whereby said flap valve accommodates the valve tube within the sleeve-like wrapping.

15. The valve bag assembly according to claim 14, wherein said valve tube is made of natural kraft paper.

16. The valve bag assembly according to claim 15, wherein the weight range of said natural kraft paper is from about 60 to 70 pounds.

17. The valve bag assembly according to claim 14, wherein said valve tube further comprises an interior surface coating disposed on said interior surface.

18. The valve bag assembly according to claim 17, wherein said interior surface coating includes an anti-static ingredient.

19. The valve bag assembly according to claim 18, wherein said interior surface coating is capable of being sonically sealed.

20. The valve bag assembly according to claim 18, wherein said interior surface coating is polyethylene.

21. The valve bag assembly according to claim 20, wherein said polyethylene has a formulation with about 40% +/- 5% low density polyethylene with metallocene and about 60% +/- 5% high density polyethylene.

22. The valve bag assembly according to claim 14, wherein the tab locks of both the main and offset layer overlap each other in a range of from about one-half to one and one-half inches.

23. The valve bag assembly according to claim 14, wherein said valve end includes two parallel fold lines and the tab locks are folded along fold lines corresponding thereto.

24. The valve bag assembly according to claim 14, wherein the width of said valve tube ranges from about three inches to about nine inches.

25. The valve bag assembly according to claim 14, wherein the valve side of the valve end includes an outer folded edge and an innermost edge of a bag flap, and the distance between the inner edge of said offset layer of said flap valve and the outer edge of said main layer equals the distance between the outer folded edge of the valve end and said innermost edge of said bag flap plus at least about two inches.

26. The valve bag assembly according to claim 14, wherein the valve side of the valve end includes an outer folded edge and an innermost edge of a bag flap, and the distance between the inner edge of said offset layer of said flap valve and the outer edge of said main layer equals the distance between the outer folded edge of the bag and the closest edge of an opening of a fill spout insertable into said valve tube for filling the bag with product.

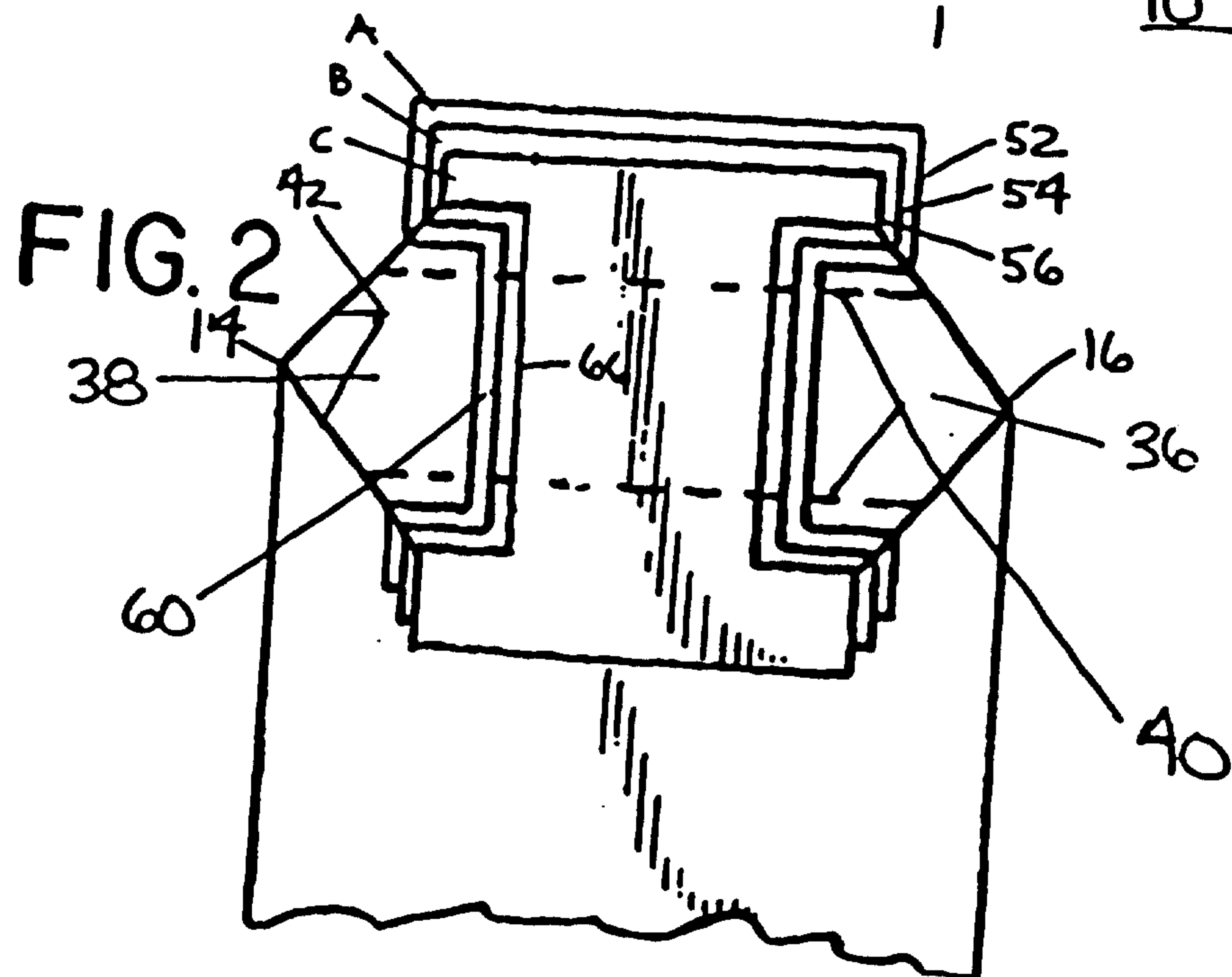
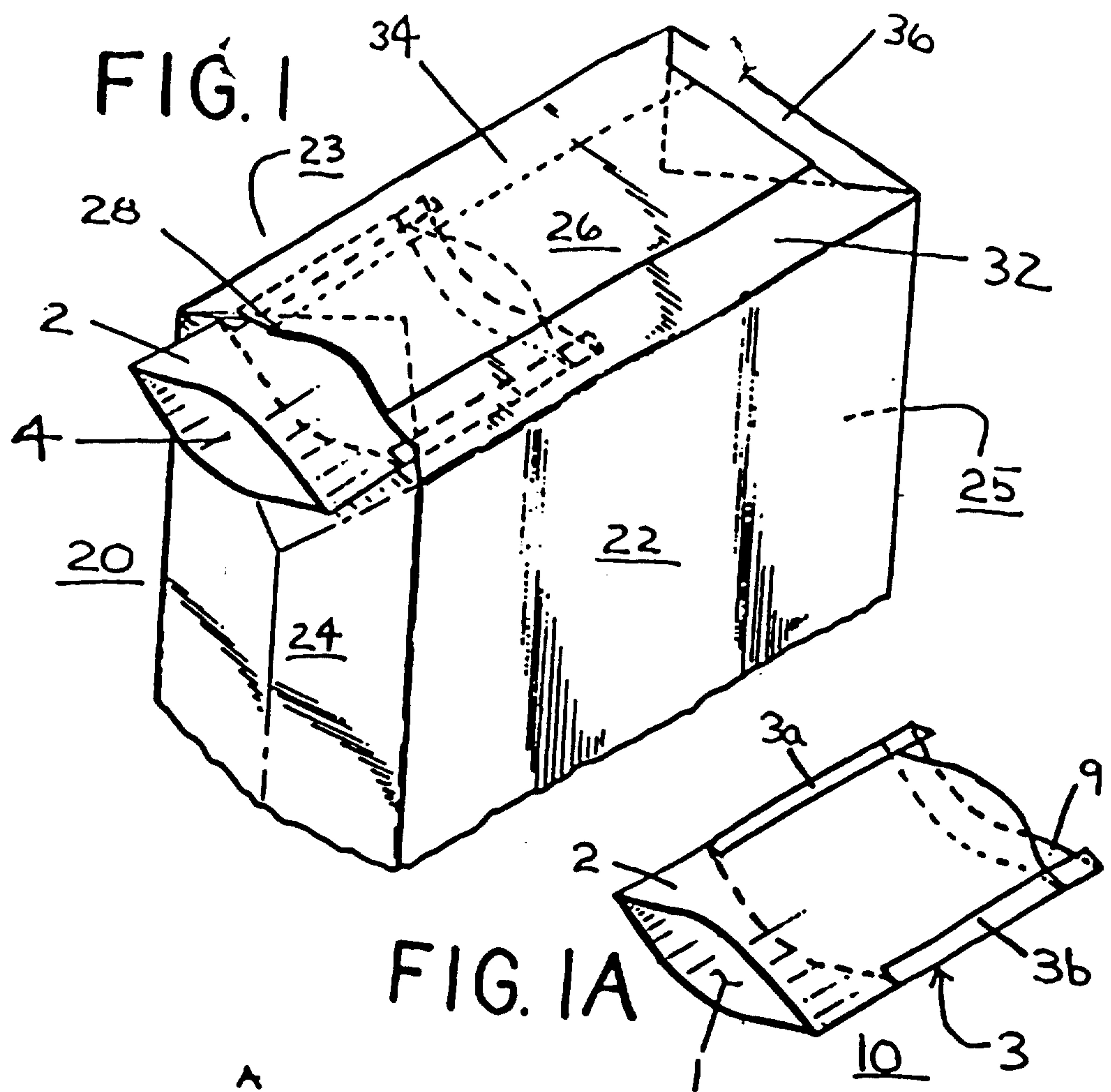
27. The valve bag assembly according to claim 14, wherein said main layer is made of natural kraft paper.

28. The valve bag assembly according to claim 14, wherein said offset layer is made of a plastic film.

29. The valve bag assembly according to claim 28 wherein the plastic comprises polyethylene.

30. The valve bag assembly according to claim 14 wherein the offset layer is shifted relative to said main layer whereby at least one tab lock of the offset layer contacts at least one tab lock of the main layer at said overlap.

31. The valve bag assembly according to claim 30 wherein the inner and outer edges of both main and offset layers have substantially the same length.



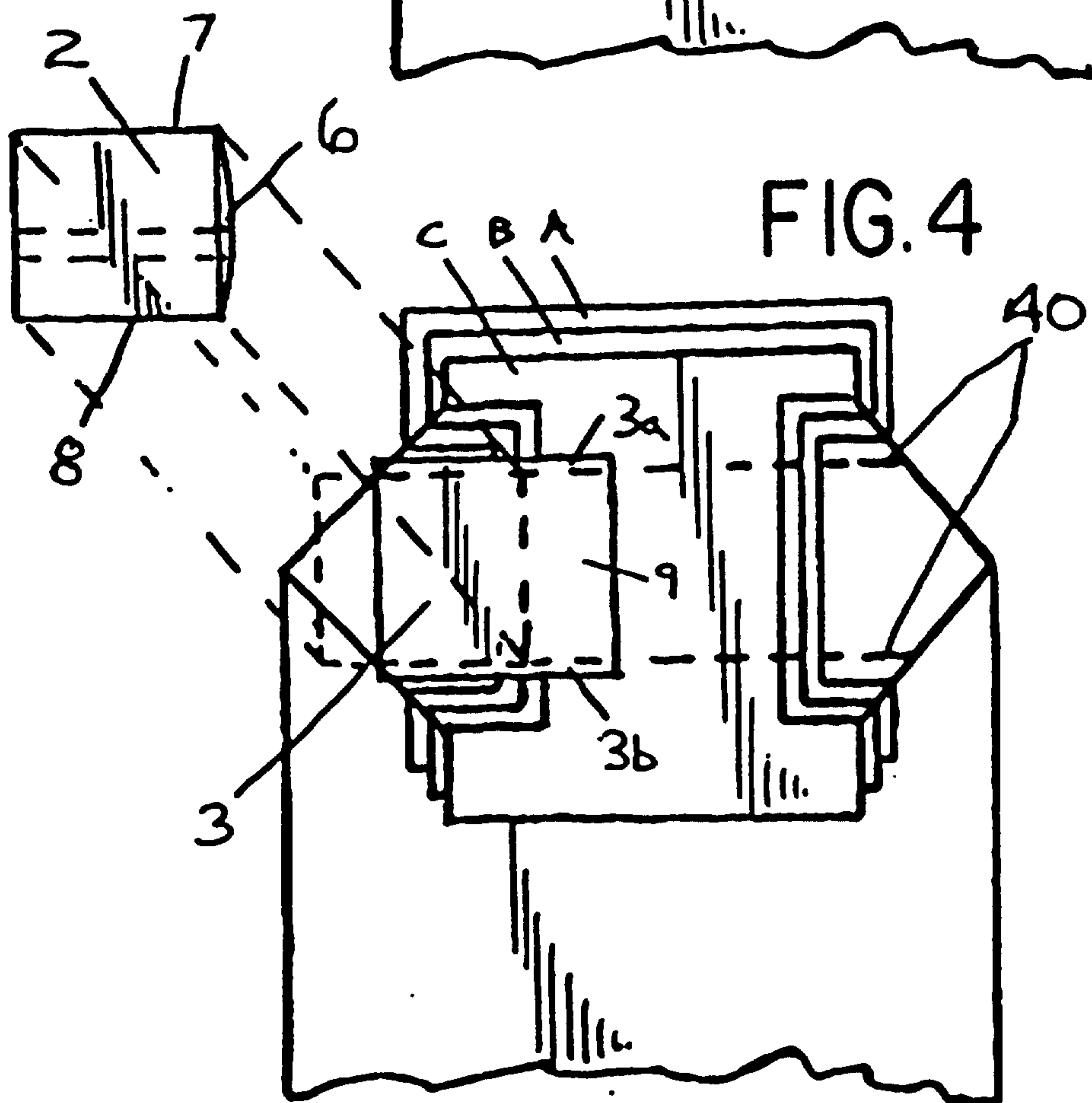
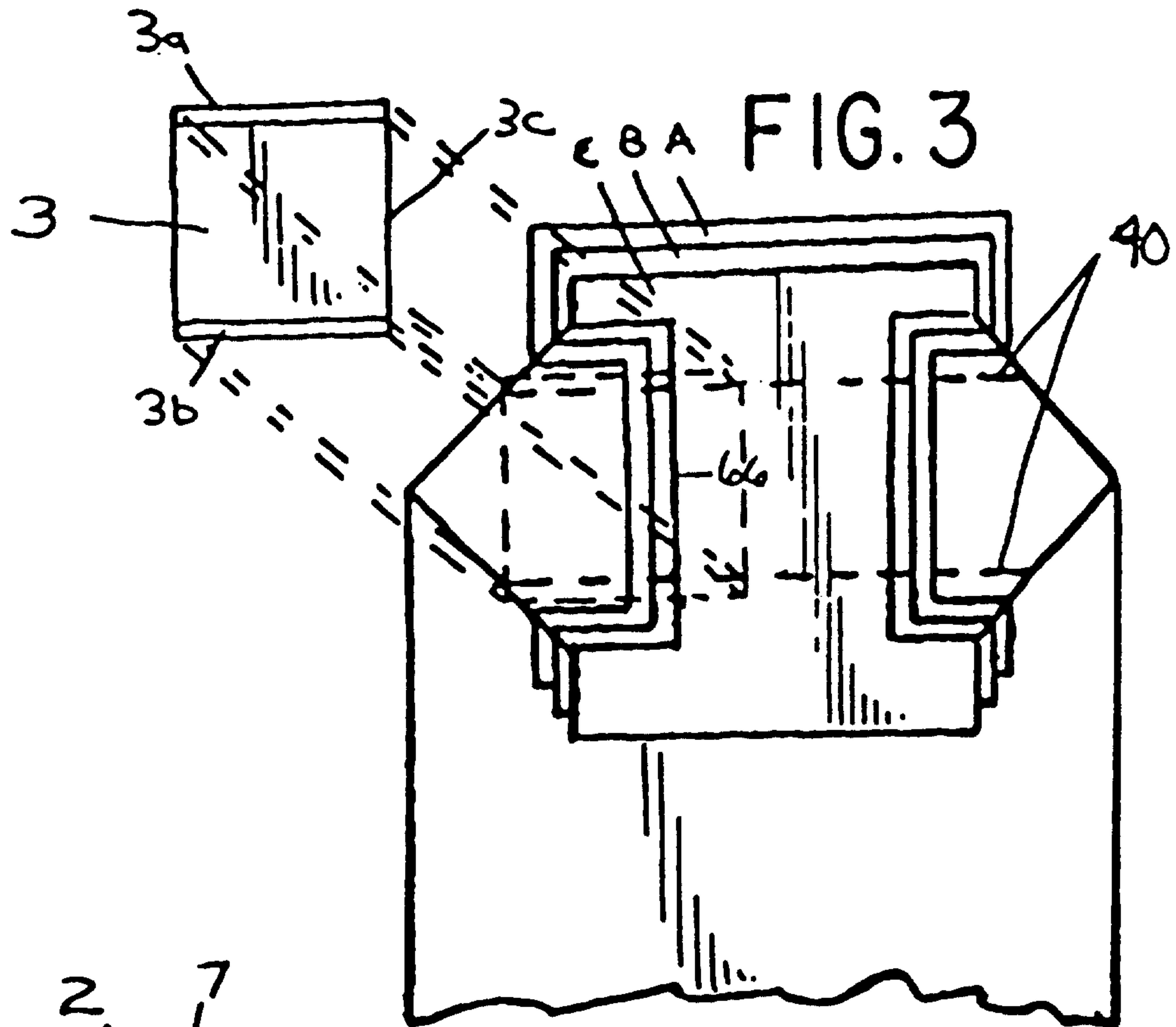


FIG. 5

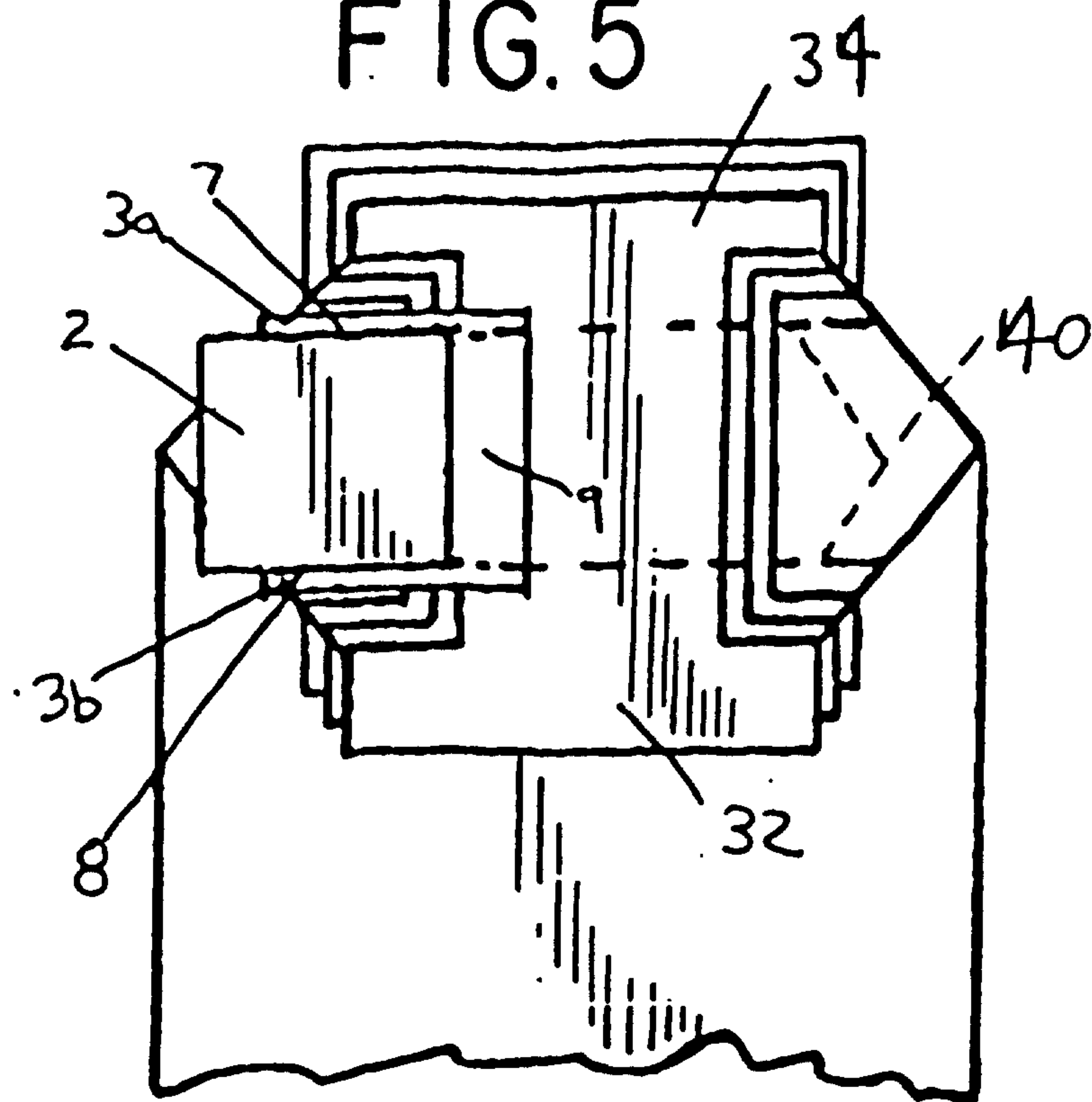


FIG. 6

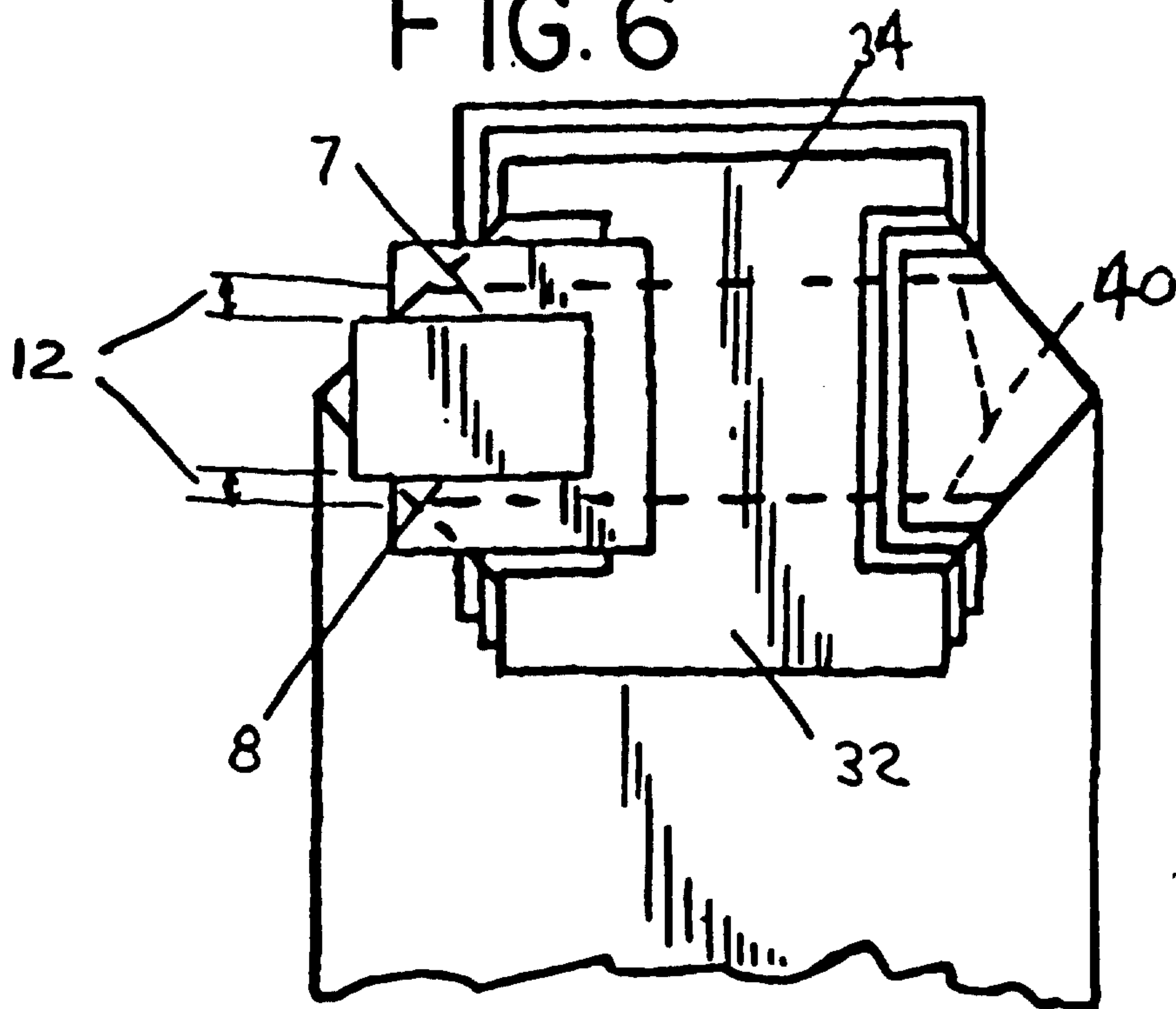


FIG. 7

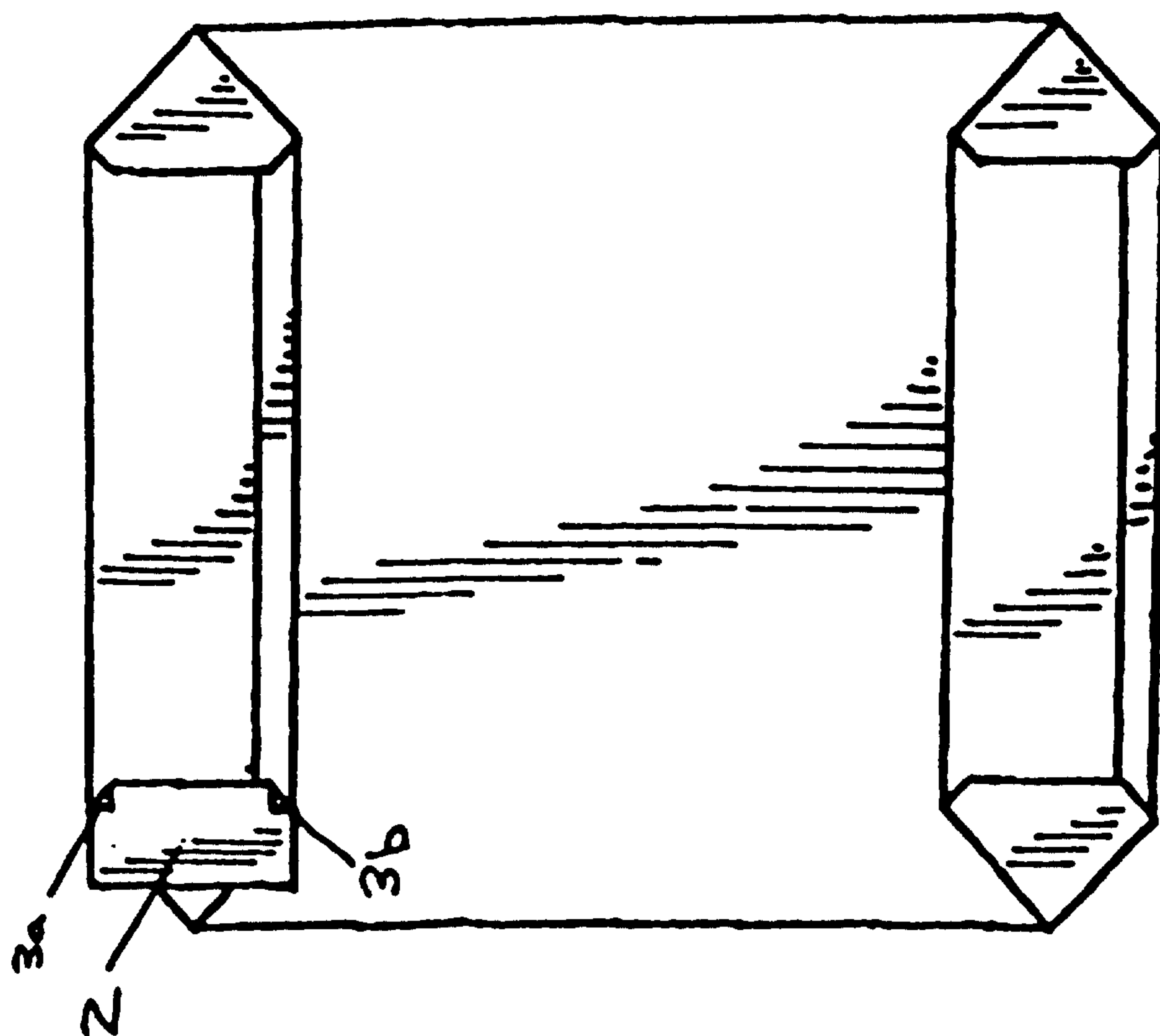


FIG. 8

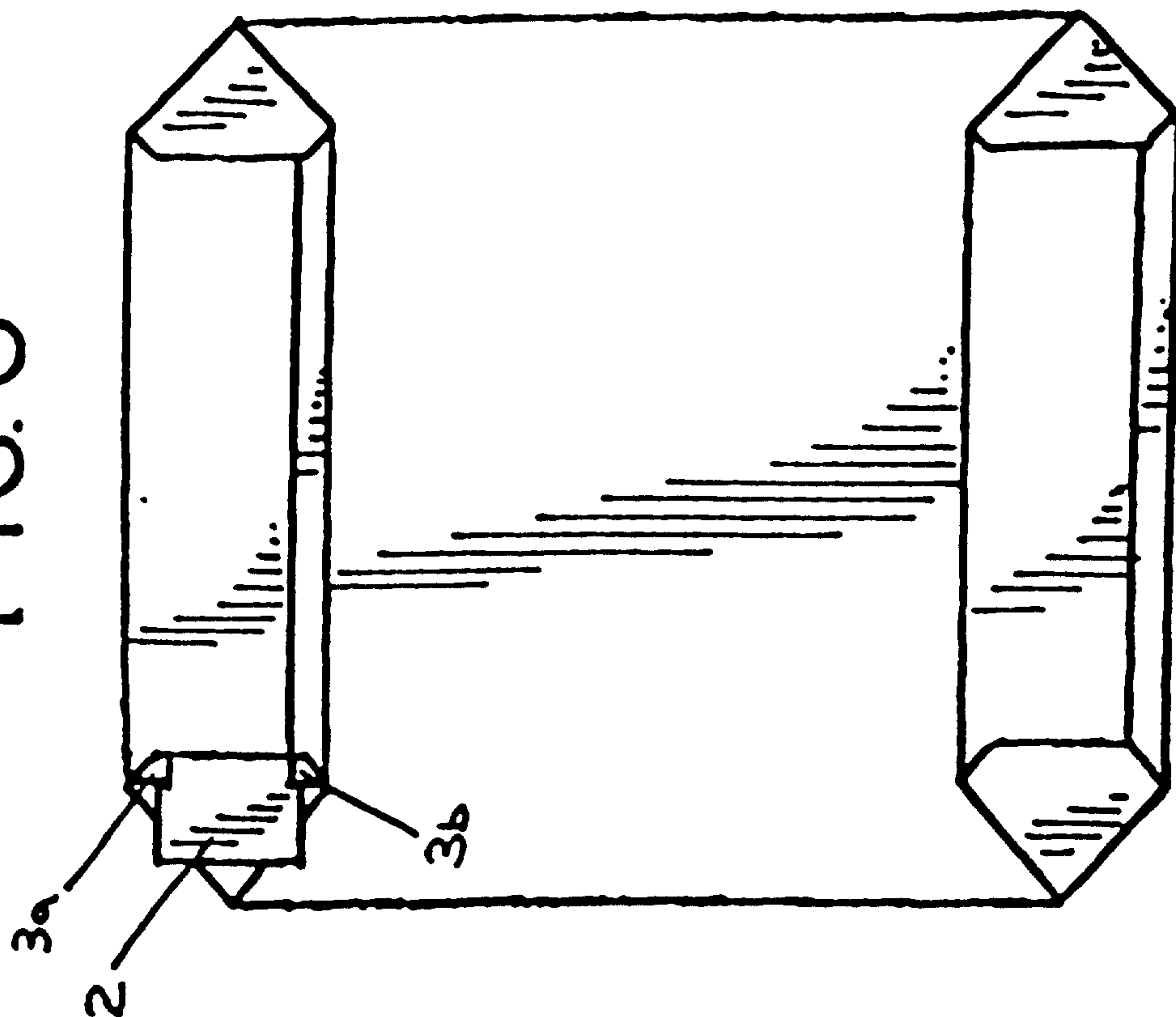


FIG. 9

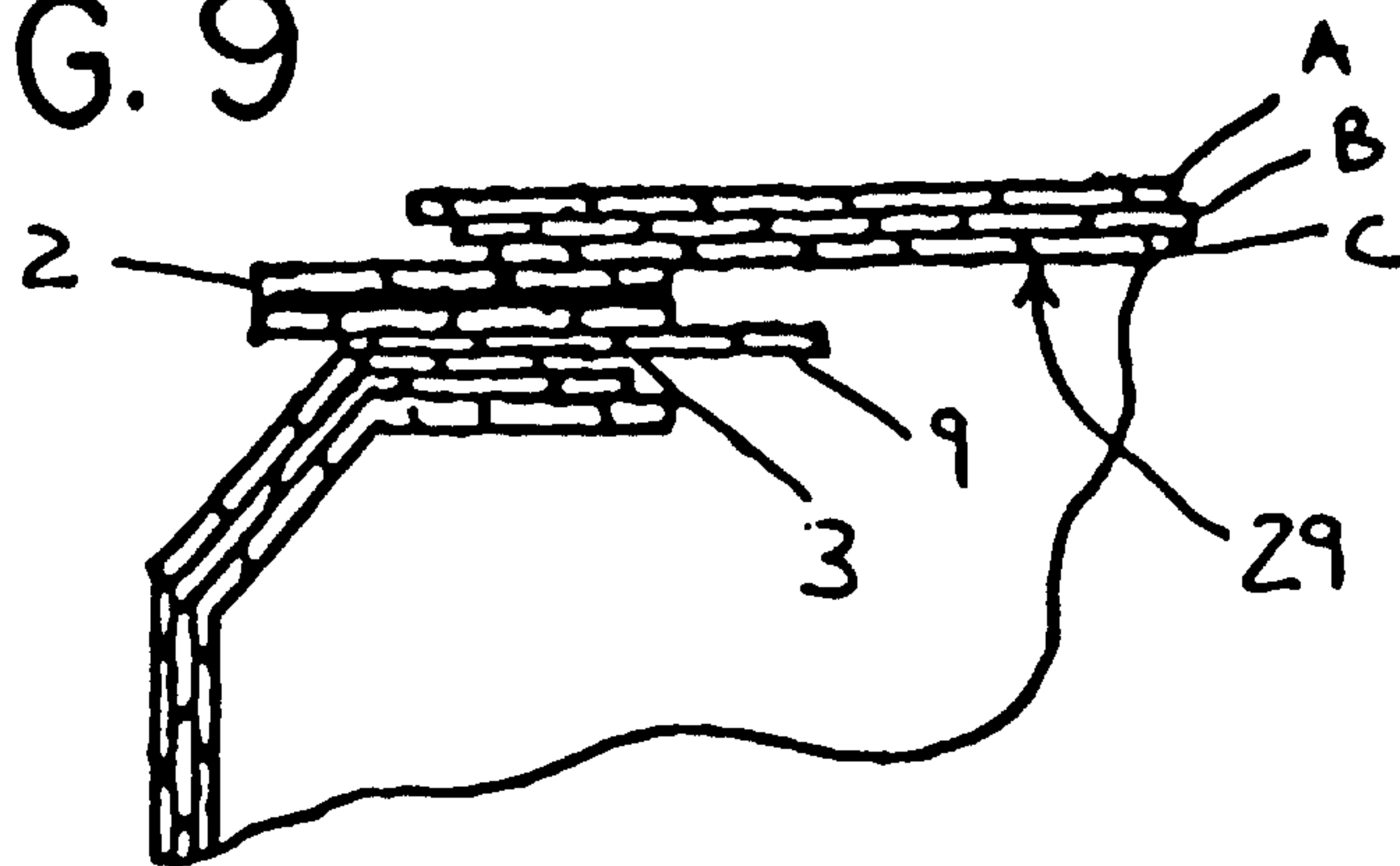


FIG. 10

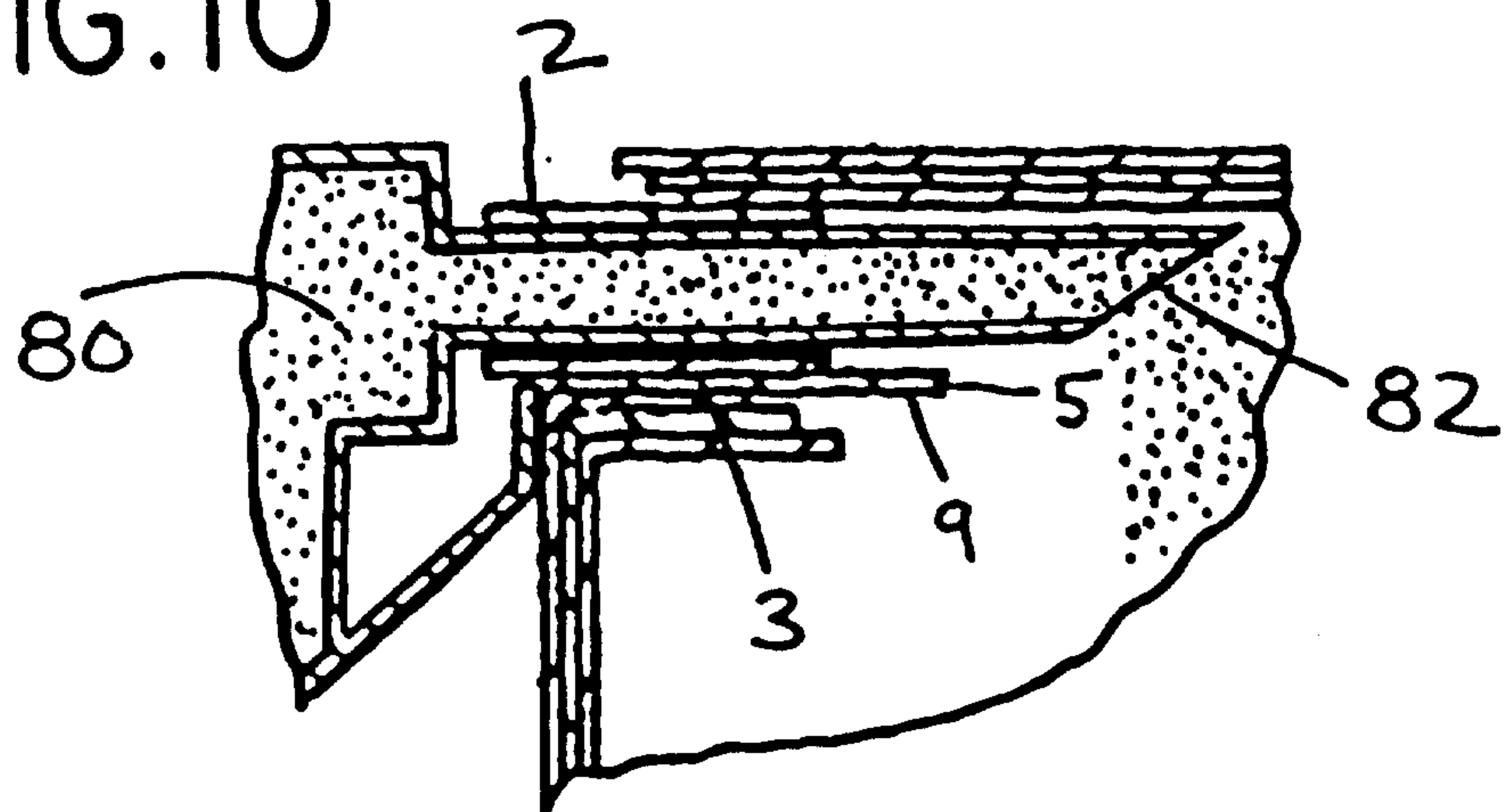


FIG. 11

