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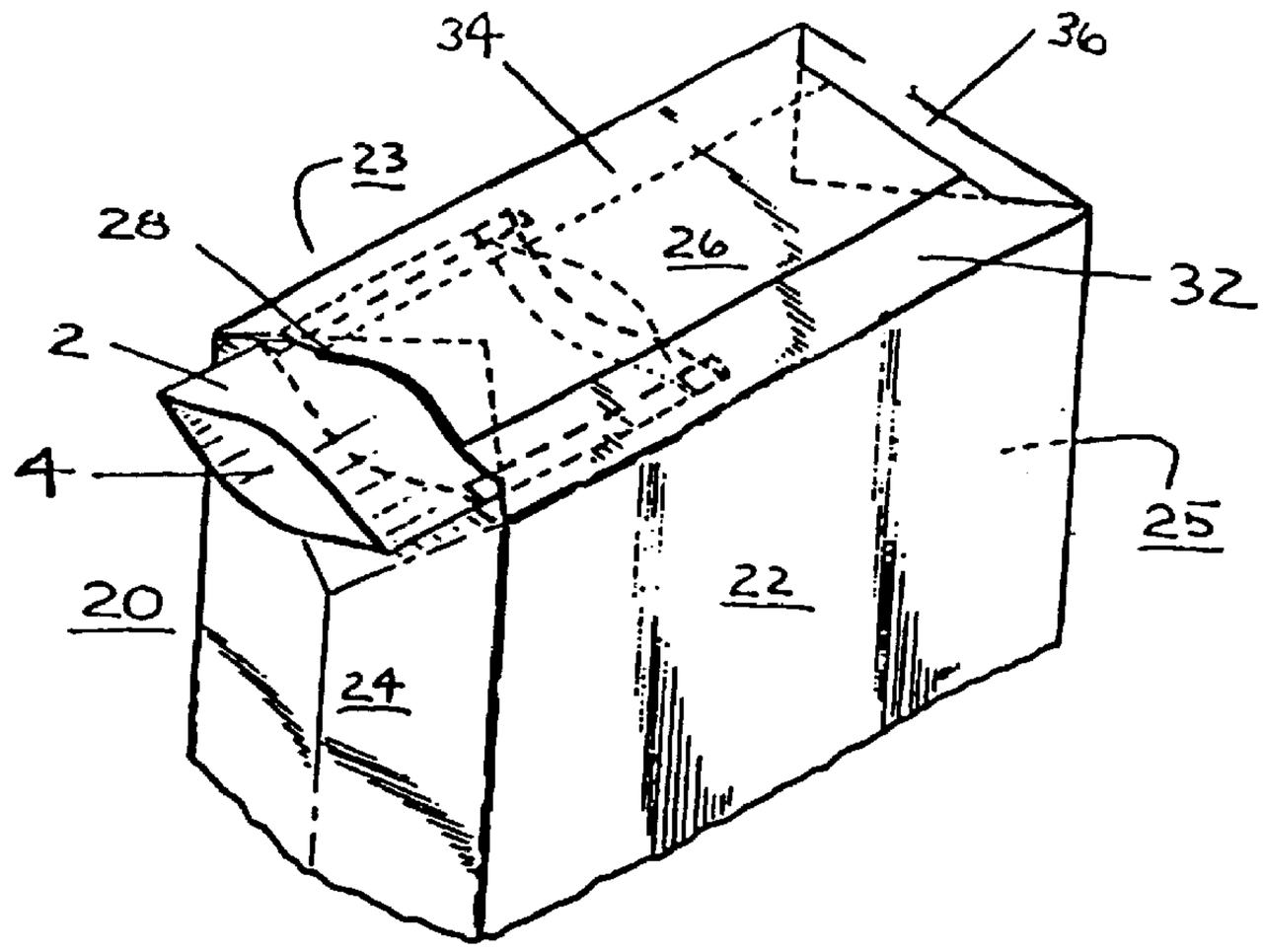
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(54) **FERMETURE A VALVE AUTOMATIQUE POUR SACS A VALVE**
(54) **AUTOMATIC SELF-CLOSING VALVE CLOSURE ASSEMBLY FOR VALVE BAGS**



(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. An automatic self closing valve assembly also is provide that requires no subsequent sealing after the filling process.

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. An automatic self-closing valve assembly also is provide that requires no subsequent sealing after the filling process.

Docket No. 1292-1015.4 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

AUTOMATIC SELF-CLOSING 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. In another embodiment, having particular suitability to large width satchel-type bags, the valve assembly automatically achieves full closure with no final sealing step required subsequent to filling the bag with product.

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.

In an alternate embodiment, it is a goal of the invention to eliminate a final sealing step whereby the valve assembly automatically reaches full closure upon filling the bag with product.

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 infold 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.

In an alternate related invention, a final sealing step is eliminated. The valve assembly automatically self-closes upon filling the bag with product. A seal lock is used having folded and overlapping paper and thin film plastic layers, or all overlapping paper layers, fully wrapping a reduced width valve tube for large size satchel-type bags.

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 an exploded view of the alternate embodiment of the valve assembly of Fig. 20.

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 **109** portion 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** illustrate a related invention in a preferred embodiment thereof. Typically in the industry, large width satchel-type bags have been made with reduced valve tube sizes, such as for satchel bottom standard widths of from about six to nine inches. A common size large width satchel-type bag has a nominal width of eight inches. The utilization of a less than full width valve tube provides for a cost savings in material. Because this smaller valve tube does not extend fully across the width of the bag, gaps between the valve tube and sides of the bag and flap valves create the danger of tearing or rupturing the valve assembly during filling and handling. Attempts at providing a reduced valve tube also have utilized thin polyethylene film closure flaps, but these too create problems involving bag rupturing and splitting, because there is little strength between the reduced valve tube and the fold lines of the satchel bottom, such as at lines **40** previously described in reference to **FIGs. 1-16**.

In addition to the reduction of costs by using a reduced valve tube, the industry has sought to further eliminate costs for sealing large size satchel bags. The utilization of a sonic sealing valve tube, such as shown in **FIG. 6** above, while effective for its intended purposes, adds cost in terms of providing a coating to the interior of the valve tube with a sonic sealable material, as described above, requiring a further sealing step, and also in regard to the

additional material for the valve tube that has to project bag-outwardly for the sealer to seal, i.e., the extension of valve tube **2** outward of the bag side **28**, as shown in **FIG. 1**.

In **FIGs. 20, 20A** and **20B**, an improved reduced valve assembly **510** is shown, which provides for an automatic self-closing, final sealing without the need for further adhesives, sonic sealing, hot melts, sealing tape, stitching, or the like. The valve assembly **510** is a tri-partite assembly that is related to the valve assembly **210** as shown in **FIGs. 16, 16A,** and **17**. The valve assembly **510** improves upon the valve assembly **210**, and affords particular suitability to closing larger width satchel-type bottom bags.

The valve assembly **510** embodies modifications to the valve assembly **210** by providing folded-over, nested portions of a seal lock **503** and offset plastic layer **505**. Further, the seal lock **503** and offset layer **505** have a sufficient lateral dimension, in relation to the width of the bag side **28,** whereby to overlap at **O** and **O′** to provide a fully peripherally wrapping sleeve-like arrangement around a valve-tube **502**.

In the illustrative example, and as in the previous descriptions, the valve bag **20** has a satchel-type bag end **26** having a width of about eight inches, which reflects a common large size satchel-type bag well known in the industry. The seal lock **503** is made of 30-80 pound high performance paper. The offset layer **505** is preferably made of thin polyethylene, preferably thinner than the thickness of the seal lock **503**. The outward edge of the seal lock **503**, valve tube **502** and bag side **28** are substantially co-terminate, i.e., ending in the same vertical plane, as shown in **FIG. 22** and as more specifically described hereinafter. Because the valve assembly **510** is automatically self-closing, the valve tube **502** need not extend bag outwardly and thus offers material cost savings. Of course, the valve assembly **510** would

still be automatically self-closing if the valve tube **502** did extend bag-outwardly, but this is a waste of material.

As previously described, the valve bag **20** has long sides **22, 23**, a bag end **26**, and a valve side **28** where a short side **24** meets the bag end **26**. The satchel-like bag end **26** is formed by folded longer flaps **32, 34** and short side flaps **36, 38**. The valve assembly **510** is generally associated with the bag end **26** in the same manner as shown for the valve assembly **210** in **FIGs. 16** and **17**, however the valve tube **502** is narrower, the seal lock **503** and offset layer **505** are nested in folds and overlapped to make a sleeve, and the valve tube **502** is shortened to terminate at the outward side of the seal lock **503**. As shown in **FIG. 16**, the seal tab lock **203** is not folded upon itself and does not overlap. Likewise the offset layer **205** is not folded over itself and is not overlapping. The seal lock **503** includes tab locks **503a, 503b, 503g** and **503h.** A folded over portion **505e** makes the tab locks **503g** and **503h** to be double-layered and form a pocket for the offset layer **505**, as will be understood in connection with **FIG. 20B**. The seal lock **503** includes an inner edge **503c**, an outer edge **503d**, and another inner edge **503f** created by the folding of folded portion **503e**. The tab locks **503a, 503b**, **503g** and **503h** have sufficient width whereby to overlap when folded around fold lines **F** and **FF** to provide the overlap **O**, which in the illustrated embodiment is approximately one inch. As in previous embodiments, the fold lines **F** and **FF** generally correspond to the fold lines **40** of the bag end **26**. Thus, the dimensions **L** shown to the sides of the fold lines **F** and **FF** would add to equal the width of the bag end **26** plus two inches in the disclosed embodiment.

The formation of the folded portion **505e** of the seal lock **505** provides a pocket-like configuration for the retention or capture of a portion of the offset layer **505**. The offset layer **505** includes opposing tab locks **505a** and **505b**, and further has an inner edge **505c** and an outer edge **505d**. A folded portion **505e** corresponds to, but is not as long as, the folded portion **503e**. The folded portion **505e** extends bag inwardly from the outside edge **505d** and forms tab locks **505g** and **505h**, which are folded in the same direction as the tab locks **505g** and **505h**. The tab locks **505g** and **505h** are nested within the pocket-like folded configuration of said portion **503e**. In the disclosed embodiment, the folded portion **503e** is approximately twice the length of the folded portion **505e**. An inner or leading edge **503f** of the seal lock **503** thereby projects farther bag-inwardly than an inner leading edge **505f** of the offset layer **505**, however stopping short of projecting to an inner opening **506** of the valve tube **502**, best viewed in **FIG. 20B**. As with the seal lock **503**, the offset layer **505** has a sufficient lateral dimension allowing the tab locks **505a, 505b, 505g** and **505h** to provide an overlap **O'** of approximately one inch, as shown in **FIG. 20A**. Along the overlaps **O** and **O'**, the seal lock **503** and offset layer **505** are adhered together during the making of the bag **20**, preferably by use of a hot melt, thereby trapping the offset layer **505** within the folded portion **503e**. In order to secure the offset layer **505** and to prevent it from shifting, because it is preferably made of a thin plastic film that can shift, the offset layer **505** is laterally stepped, or shifted, to displace its outside later edge **505i** a short distance from an outside edge **503i** of the seal lock **503**, also as best viewed in **FIG. 20B**. In the disclosed embodiment, the shifting shown at **S** is about one-quarter inch. It generally would fall in the range of from about 1/16 to 3/8 inches. This shift, or stepping **S**, thereby provides a small

stepped-out part of the offset layer **505** relative to the seal lock **503** to allow the adhesive to come into contact with both the seal lock **503** and the offset layer **505** along the overlaps **O** and **O'**. The stepping **S** could either be in either lateral direction, i.e. leftward or rightward depending upon whether the tab locks **503a, 503g** overlap **503b, 503h** or vice versa. As shown in **FIG. 20A**, the tab locks **503a** and **503g** overlap tab locks **503b** and **503h** accordingly, the shifting **S** is shown in the rightward direction of the arrow for step **S** in **FIG. 20B.** Due to the overlaps **O** and **O'**, there is no gap between the tab locks **503a**, **503g** and **503b**, **503h** of the seal lock **503**, or between the tab locks **505a**, **505g** and **505b**, **505h** of the offset layer **505** contrary to the relationships of the tab locks shown for seal tab lock **203** and offset layer **205** of the embodiment for valve assembly **210**. The valve assembly **210** leaves a gap across the top of the valve tube **202**.

The valve assembly **510** provides a two-layer flap valve **509** and single layer flap valve **519**, the later of which is created by the inward offsetting of the seal lock **503** and offset layer **505** from the inner opening **506** of the valve tube **502**. Specifically, in reference to **FIG. 20B**, it would be understood that product filling inside the valve bag **20** will push upward against both the seal lock **503** and offset layer **505** at the flap valve **509** and press against both of these layers. However, from the inner edge **503c** of the seal lock **503** to the inner edge of **505c** of the offset layer **505**, at the flap valve **519**, only the thin plastic offset layer **505** would be pushed and compressed upwardly by the product. Thus, at the flap valve **509**, the portions of the seal lock **503** and offset layer **505** above and below the valve tube **502** are both pressed together. Inwardly of the inner edge **503c** of the seal lock **503**, at the flap valve **519**, only the portions of the offset layer **505** above and below the valve tube **502**

would be pressed together in a sealingly tight relationship. In further achievement of this sealing closure, the pocket-like portions formed by the folded portions **503e** and **505e** will be observed to form a trapping double collar encircling the valve tube **502** in order to further prevent sifting of material between the valve assembly **510** and the paper plies of the bag end **26** and also along gaps **G** and **GG** formed between the valve tube sides **507** and **508** and fold lines **F** and **FF**, respectively, as shown in **FIGs. 20** and **20B**. These folded portions **503e** and **505e** create a peripheral trap for catching particles and comminuted or granulated materials seeking to otherwise sift and leak outwardly of the bag during filling.

In the illustrative embodiment, the width of the valve tube **502** is slightly less than two-thirds of the width of the bag end **26**. Accordingly, in the disclosed embodiment, the gaps **G** and **GG** are approximately one and one-half inches each. The valve tube **502** has a width in the range of from about 50% to 80% of the width of the bag end **26**.

The valve tube **502** has an outer opening, or outer end **511**, which is coterminous with the outward edge **503d** and valve side **28** of the valve bag **20**. The valve tube **502** has an inner opening **506** through which the product is passed into the bag interior. In the disclosed embodiment the length of the valve tube **502** between the outer opening **511** and inner opening **506** is substantially the same as the distance between the outer edge **503d** and inner edge **503c** of the seal lock **503**, herein is about four and one-half inches. The offset layer **505** extends bag inwardly of the edge **503c** approximately three and three-quarter inches, but this dimension may vary, as long as the flap valve **519** has sufficient surface area to provide effective sealing closure bag inwardly of the inner edge **503c** of the seal lock **503**.

The valve tube **502**, like the valve tube **202** of the valve assembly **210**, includes an inner surface **501**. However, the inner surface **501** need not be provided with any sealable coating, because a sonic or other final sealing is not required for the valve assembly **510**. The valve tube **502** also has a valve channel **504** extending between the outward opening **511** and inner opening **506** into which a filling nozzle, such as nozzle **80** shown in **FIG. 10**, may be inserted for injecting product into the valve bag **20**.

Similar to the assembly of the valve assembly **210** with the bag valve **20** shown in **FIGs. 17** and **18**, the assembly of the valve assembly **510** with the valve bag **20** is achieved by placing the seal lock **503**, having pocketed at its portion **503e** the folded portion **505e** of the offset layer **505**, onto the unfolded satchel bottom **26** of the valve bag **20**. Thereafter, the valve tube **502** is similarly placed and glued onto the folded-together seal lock **503** and offset layer **505**, as shown in **FIG. 20B**. The seal lock **503** and offset layer **505** are then folded around the fold lines **F** and **FF** with the bag flaps along fold lines **40**, whereupon starch based adhesive, or the like, adheres the valve bag **20** to the valve assembly **510**.

As a result, the valve assembly **510** provides a tri-partite arrangement of a valve tube **502**, seal lock **503** and offset layer **505** providing a reduced valve tube width and an automatically self- closing valve with no outward extension, thereby eliminating a final sealing. The valve bag **20** requires no further mechanical closure or sealing step on the production line. Accordingly, the utilization of the valve assembly **510** for the larger size satchel-bottom bag satisfies the needs of the industry for filling such type bags with comminuted fine, granular materials without leakage or sifting.

While specific embodiments of the present invention have been shown here for the purposes of explaining preferred and alternate embodiments of the inventions, 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 an including a valve side, an interior portion and an exterior surface, said valve side including an opening at said valve end for accommodation therein of a valve; and,

a valve having:

a valve tube disposed within the said opening of said valve side and having a width smaller than said opening, the valve tube further having an inner opening, an outer opening, an interior surface and an exterior surface, the inner opening extending into the interior portion of said tubular bag body and the outer opening being substantially coterminous with the opening of said valve side of the tubular bag body, the outer opening being open outwardly of the exterior surface of said tubular bag body, said valve tube providing a channel through said opening of the valve side for passage into the interior portion of said valve bag; and

flap valve members having a seal lock layer and an offset layer, both layers having an inner edge, an outer edge and oppositely folding tab locks, the inner edge of said offset layer extends past the inner edge of said seal lock layer, said outer edges formed by folding said seal lock and offset layers to nest together thereat, said outer edges being substantially coterminous with the outer opening of said valve tube, the seal lock and offset layers being disposed at said valve side with the tubular bag body opening and around the exterior surface of the said valve tube, the inner edge of said offset layer extending past the inner opening of said valve tube, said tab locks of both said seal lock and offset layers being folded over the valve tube a sufficient distance overlap forming a sleeve-like configuration, whereby said seal lock and offset layers accommodate the

valve tube within the sleeve-like configuration, said sleeve-like configuration having a width substantially the same as the width of the opening of said valve side, said seal lock and offset layers forming flap valves for closing the valve tube and the opening of the valve side of the tubular bag body.

2. The valve bag assembly according to claim 1 wherein said inner edge of said seal lock layer is substantially coterminous with the inner opening of the valve tube.

3. The valve bag assembly according to claim 1 wherein the width of the sleeve-like configuration creates gaps to the sides of the valve tube.

4. The valve bag assembly according to claim 1 wherein the valve assembly provides a non-mechanical automatic self-closure upon the filling of the interior portion of the tubular bag body.

5. The valve bag assembly according to claim 1 wherein the oppositely folding tab locks are bonded together along said overlap.

6. The valve bag assembly according to claim 1 wherein the width of the valve tube is in the range from about 50%-80% of the width of the opening at the valve side of the tubular bag body.

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

8. The valve bag assembly according to claim 7, wherein the weight range of said natural kraft paper is from about 60 to 70 pounds.

9. The valve bag assembly according to claim 1, wherein the oppositely folding tab locks overlap by at least about one inch.

10. The valve bag assembly according to claim 1, wherein the valve end is a satchel-type bag end having a width of from about six inches to about nine inches.

11. The valve bag assembly according to claim 1, wherein the inner edge of said offset layer extends bag inwardly past the inner opening of the valve tube by at least one inch.

12. The valve bag assembly according to claim 1, wherein the valve side of the bag 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 and the outer edge of said seal lock 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.

13. The valve bag assembly according to claim 1, wherein said offset layer is made of thin plastic film.

14. The valve bag assembly according to claim 1, wherein said film is polyethylene.

15. The valve bag assembly according to claim 1 wherein the offset layer is shifted relative to said seal lock layer whereby at least one tab lock of the offset layer contacts at least one tab lock of the seal lock layer.

16. The valve bag assembly according to claim 1 wherein the seal lock and offset layers are folded at said outer edge to form a collar around the valve tube to prevent product leakage around the valve tube.

17. A method of filling and automatically self-closing a valve bag assembly comprising the steps of:

inserting a fill spout into the outer opening of a valve tube to open the valve tube and to dispose an opening of said fill spout past a inner opening of a sleeve-like flap valve member arranged around the valve tube;

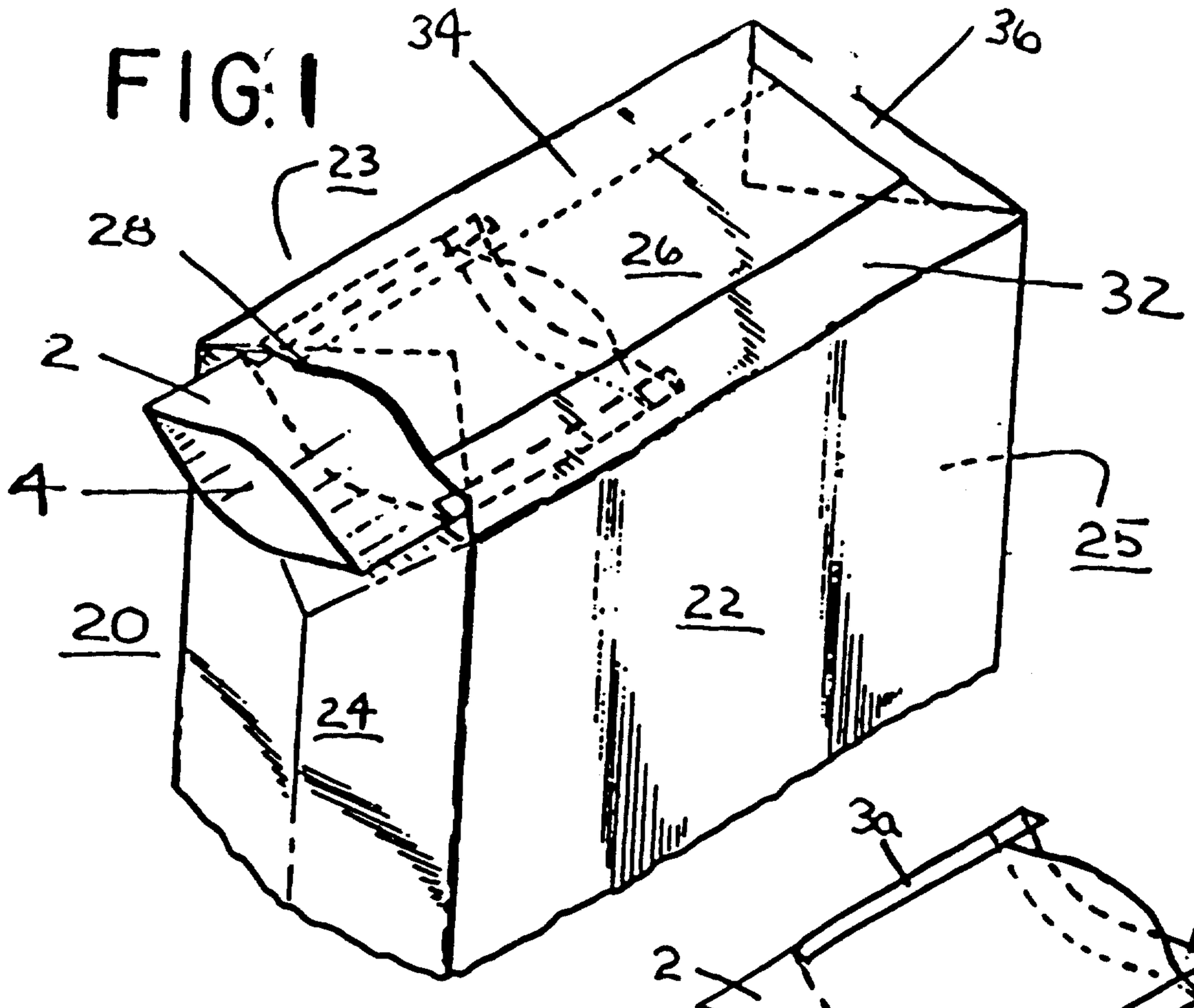
introducing product through the fill spout;

removing the fill spout;

moving the flap valve member to automatically self-close said valve tube as said fill spout is being removed; and

moving the flap valve member to automatically self-close gaps between said valve tube and bag, and thereby blocking product from sifting outward past the valve tube.

FIG. 1



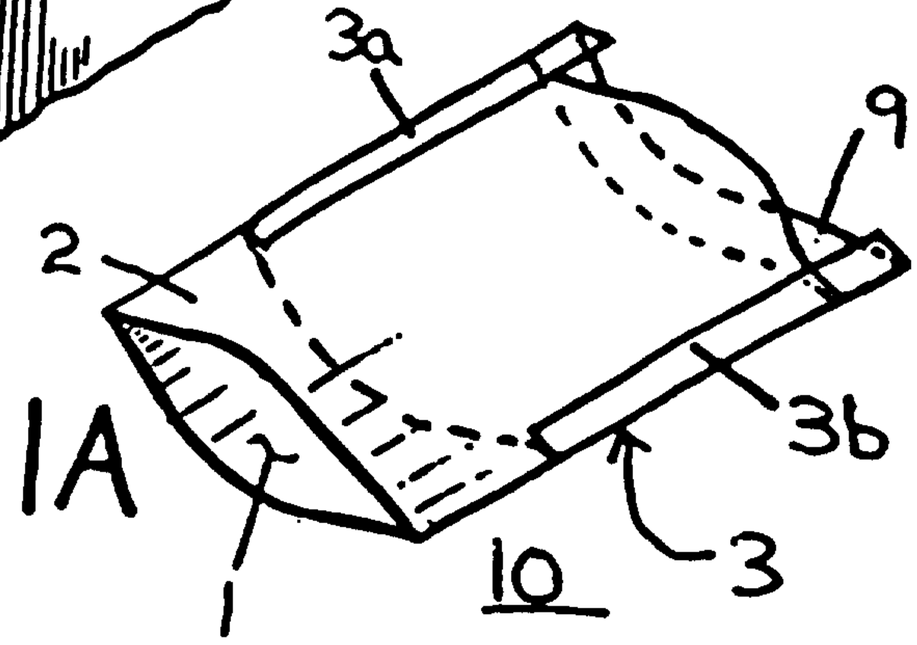
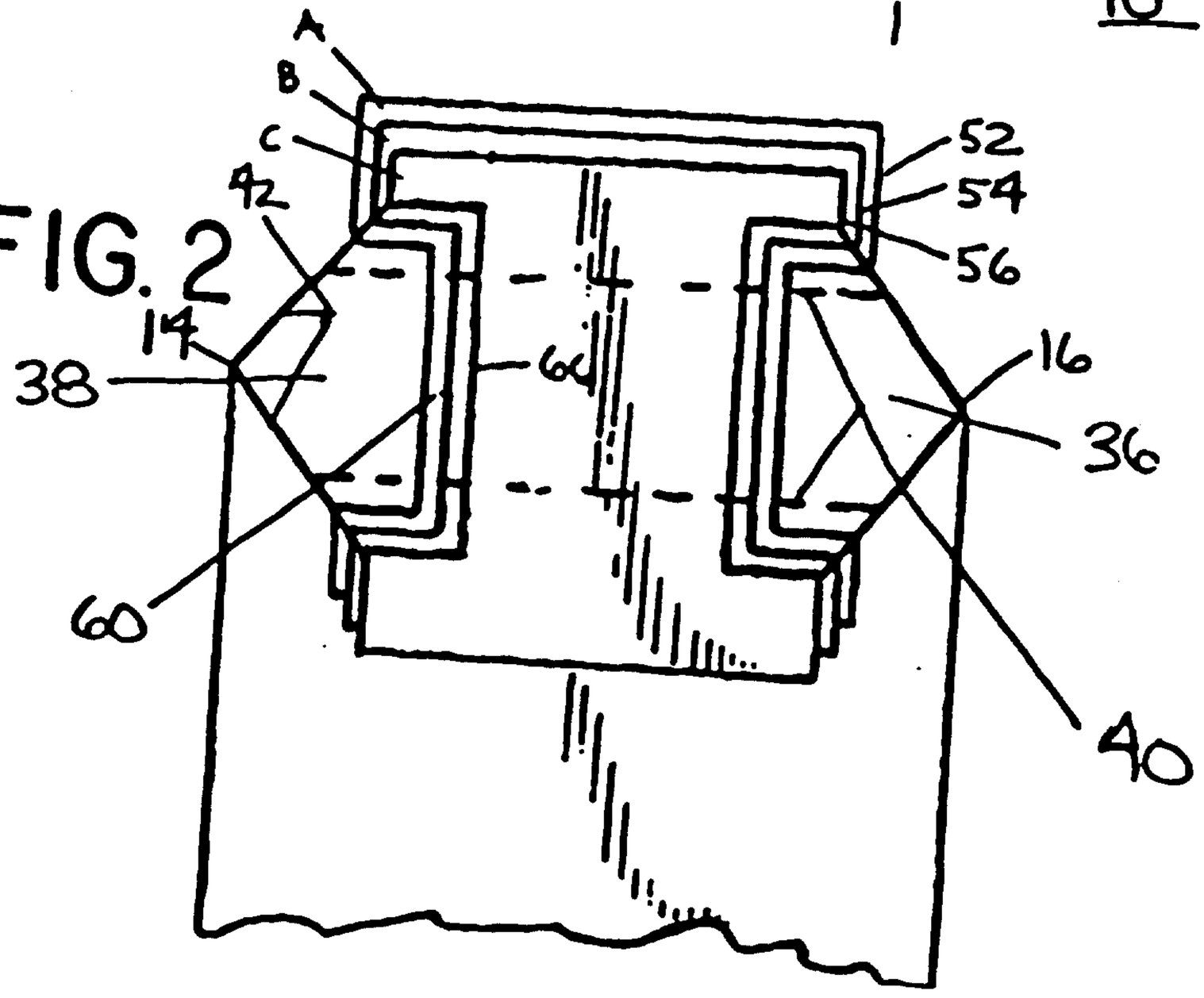


FIG. 1A

FIG. 2



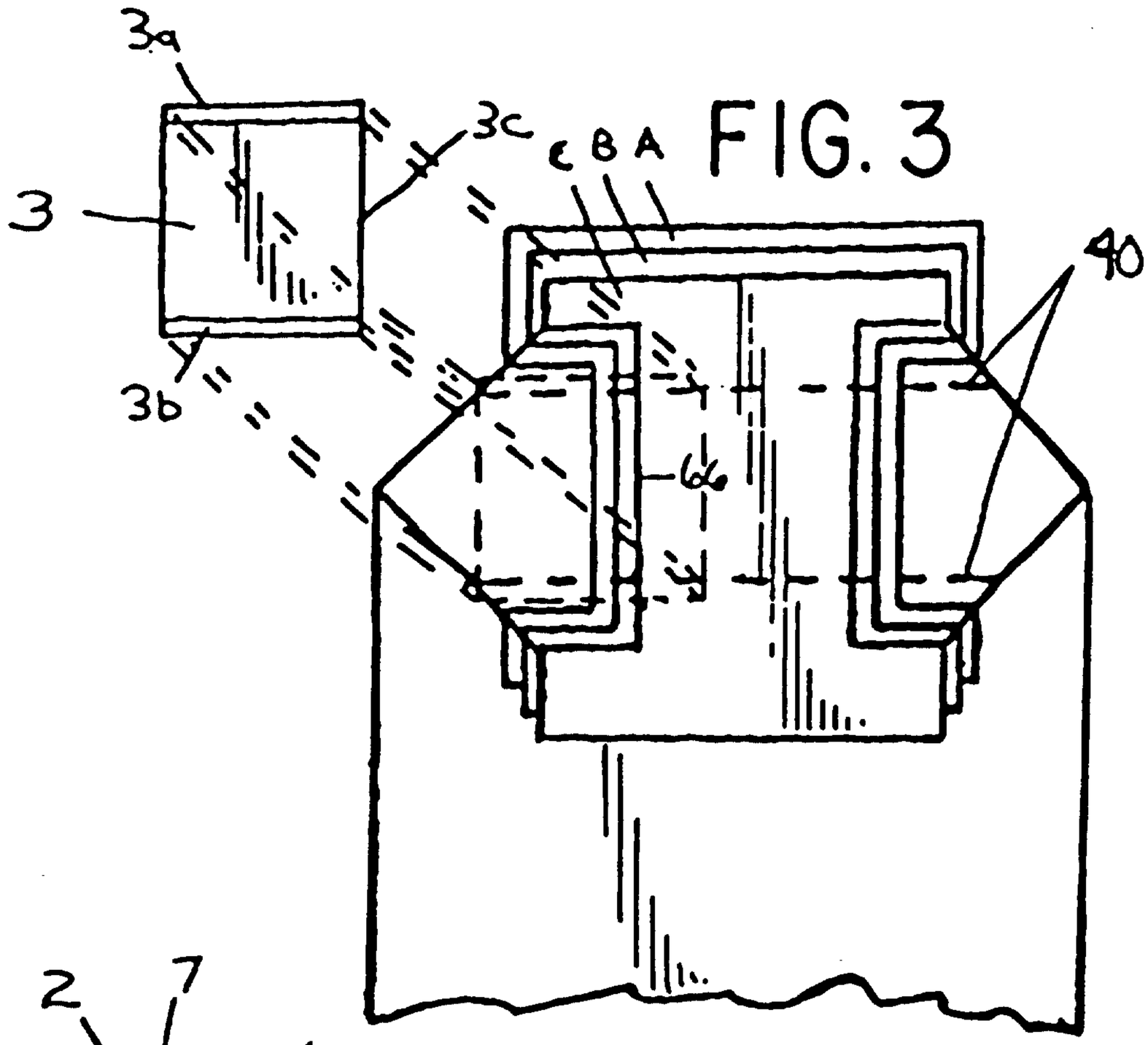


FIG. 3

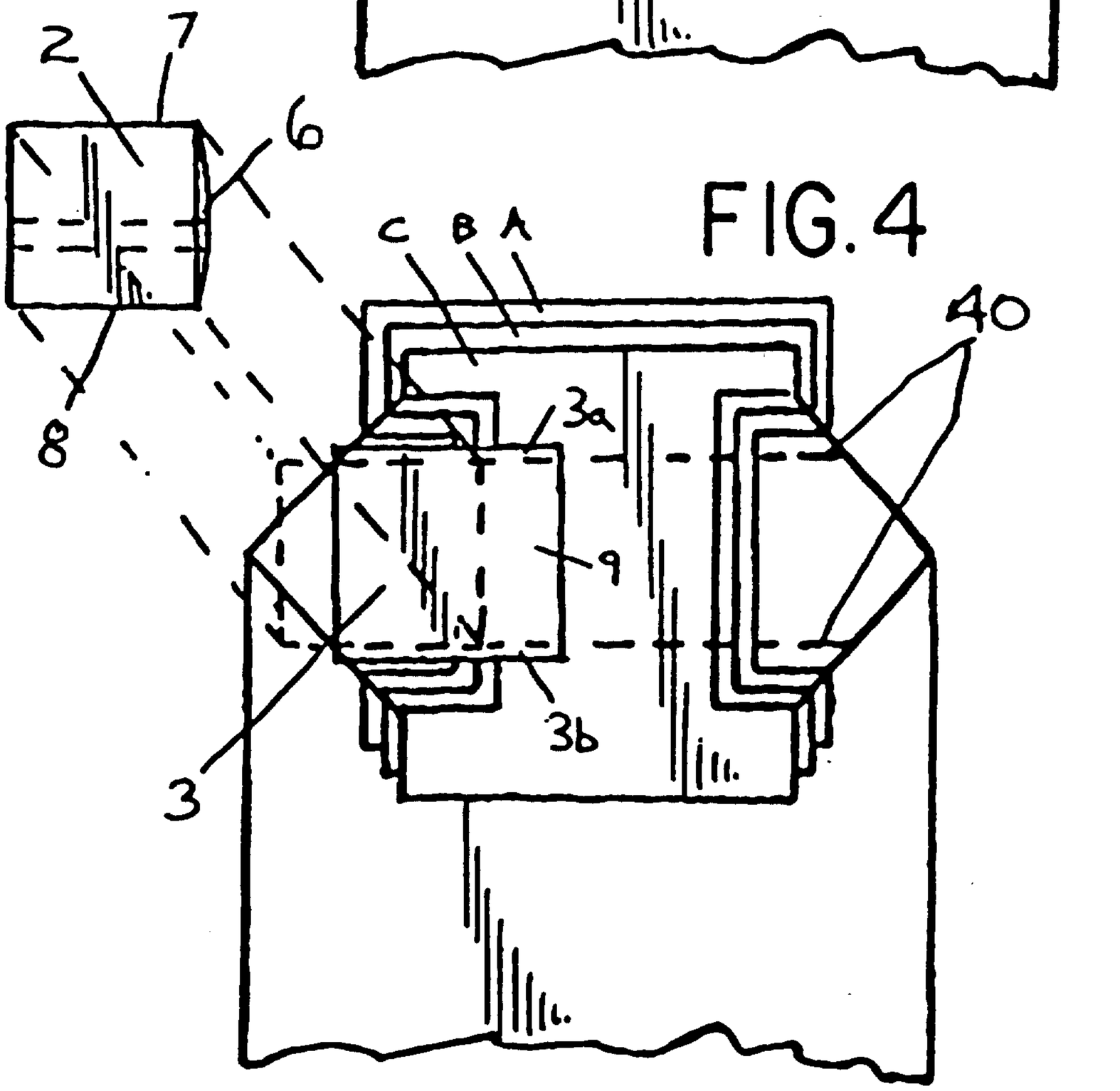


FIG. 4

FIG. 5

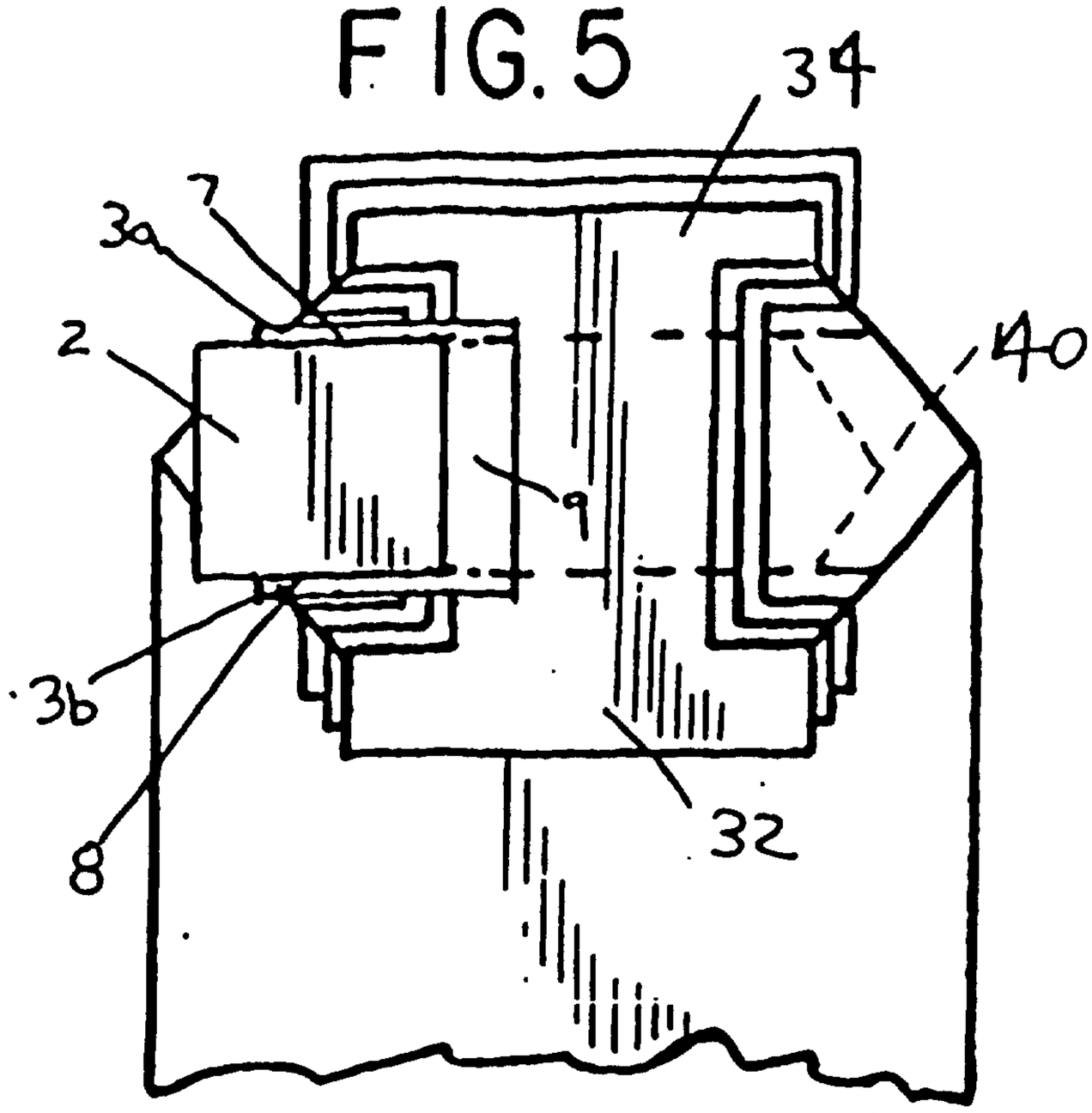


FIG. 6

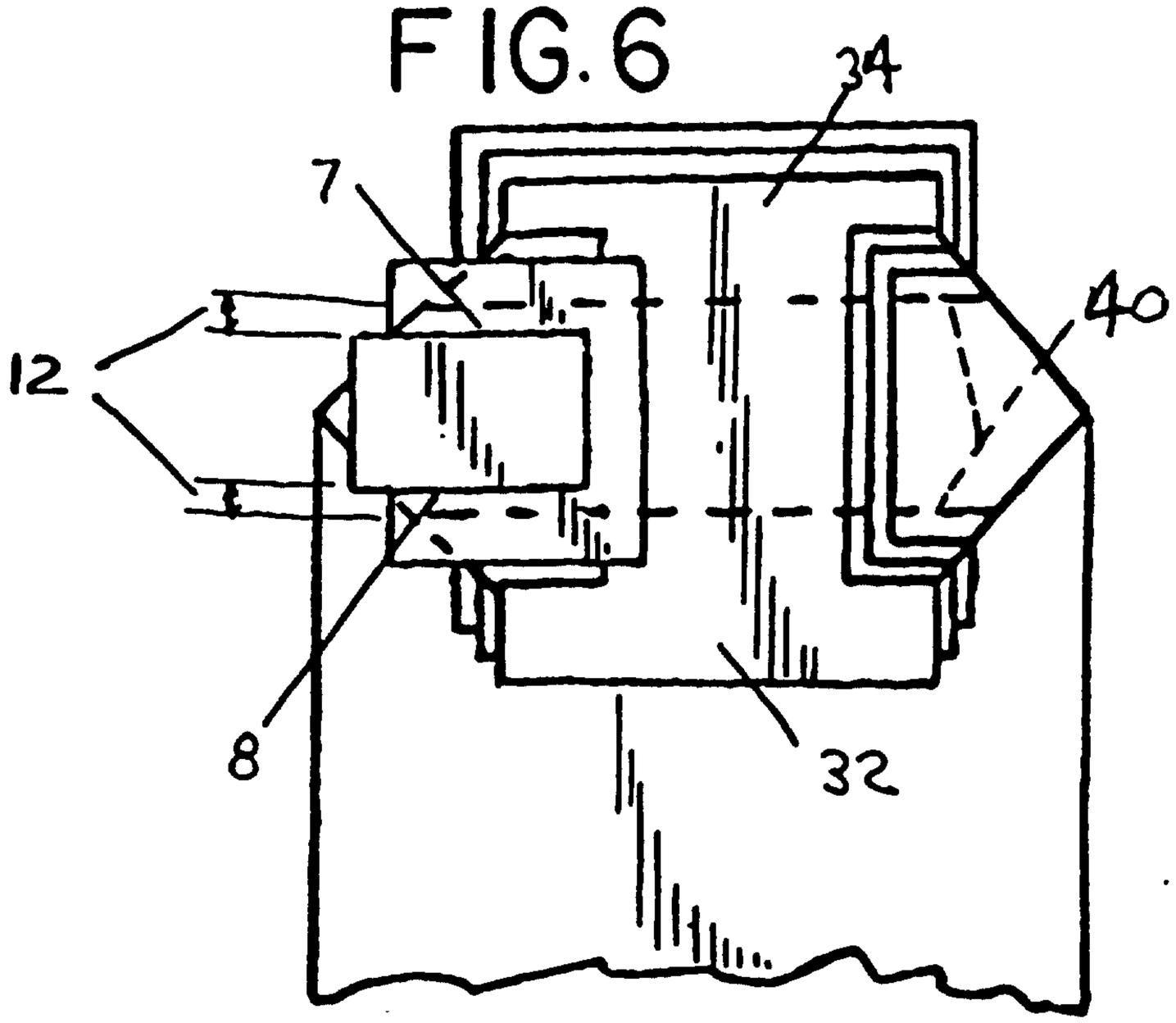


FIG. 8

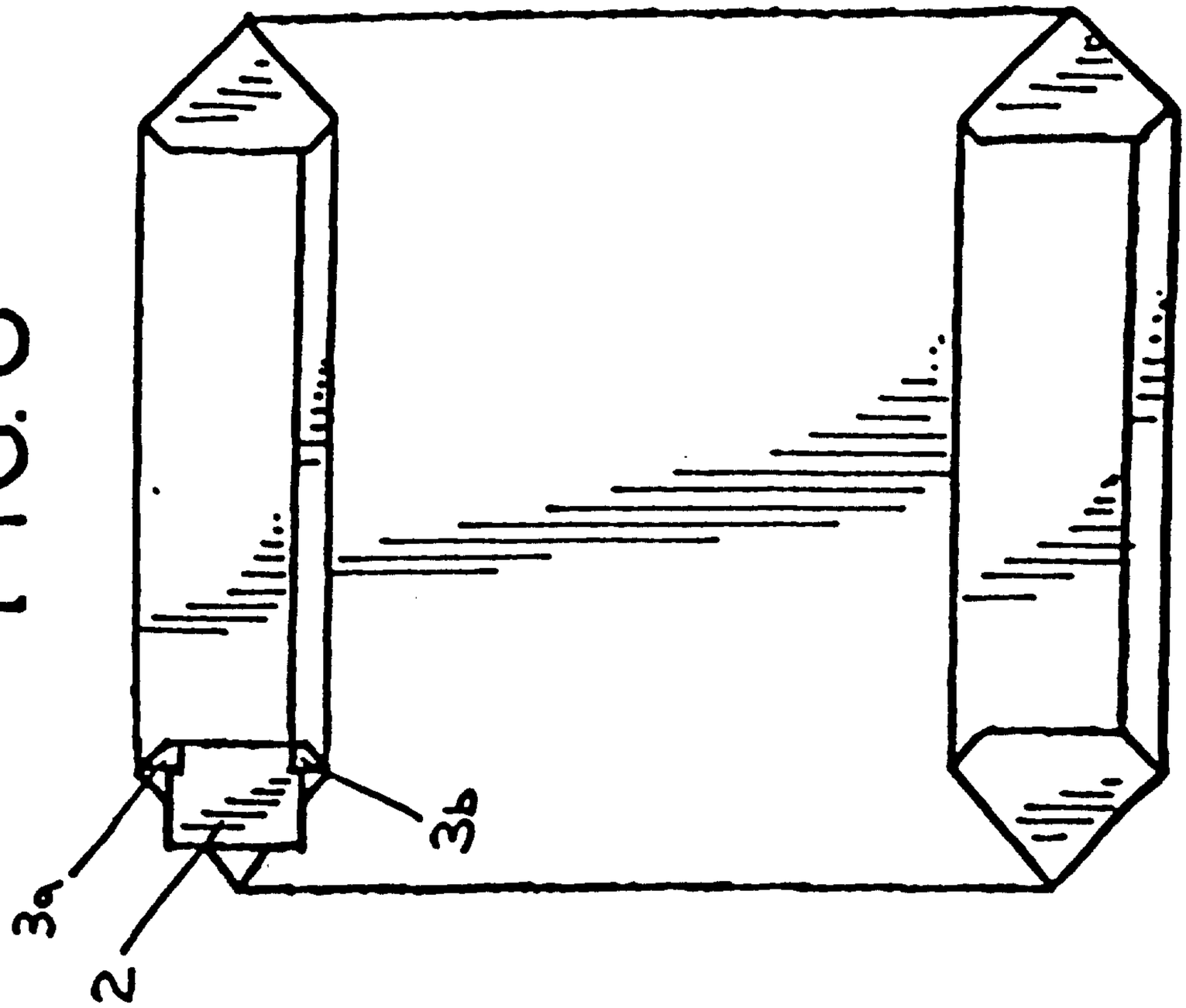


FIG. 7

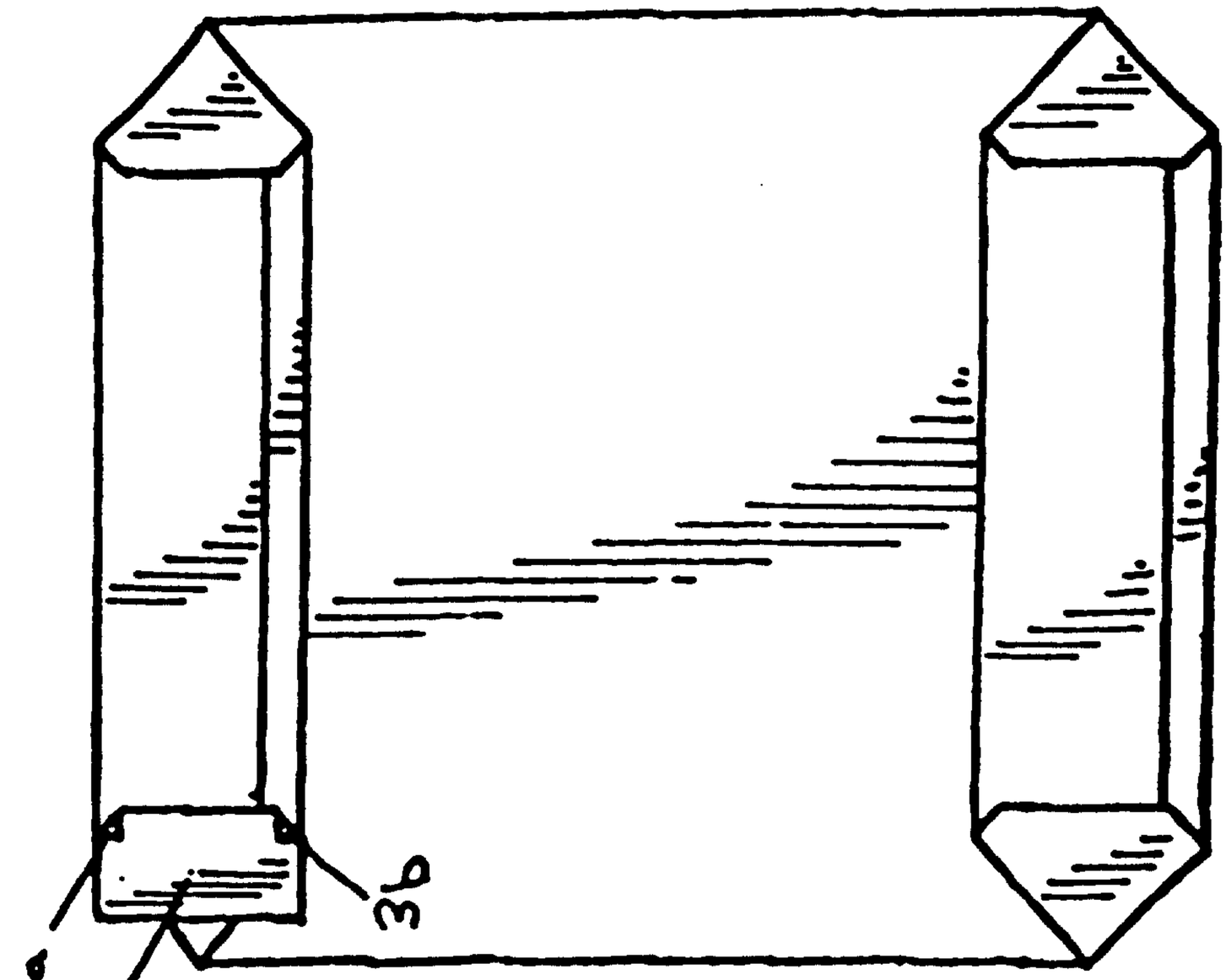


FIG. 9

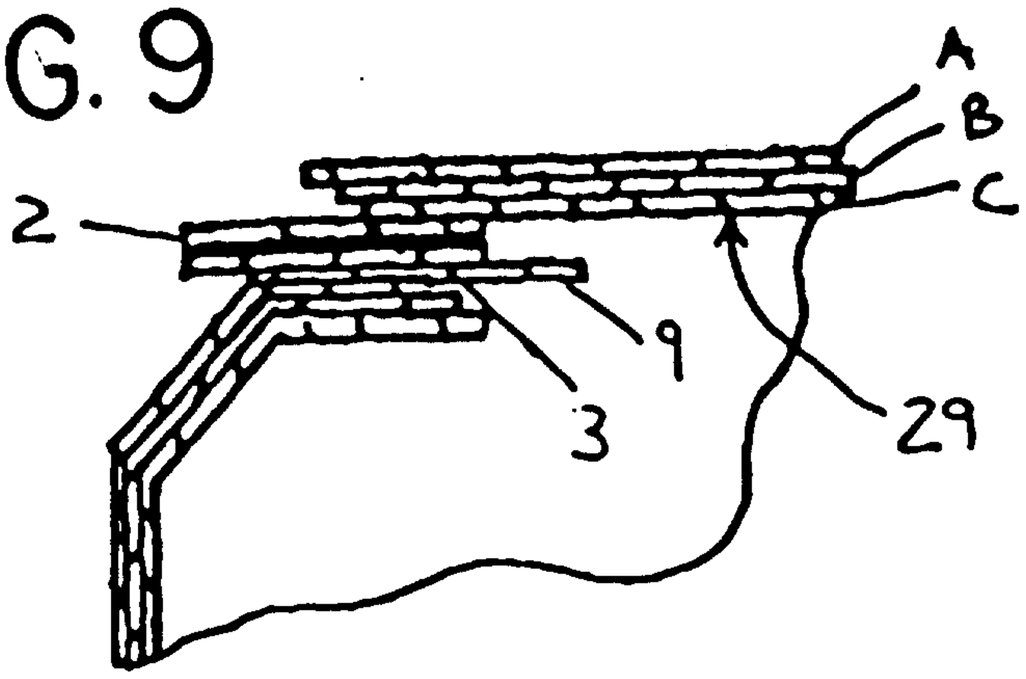


FIG. 10

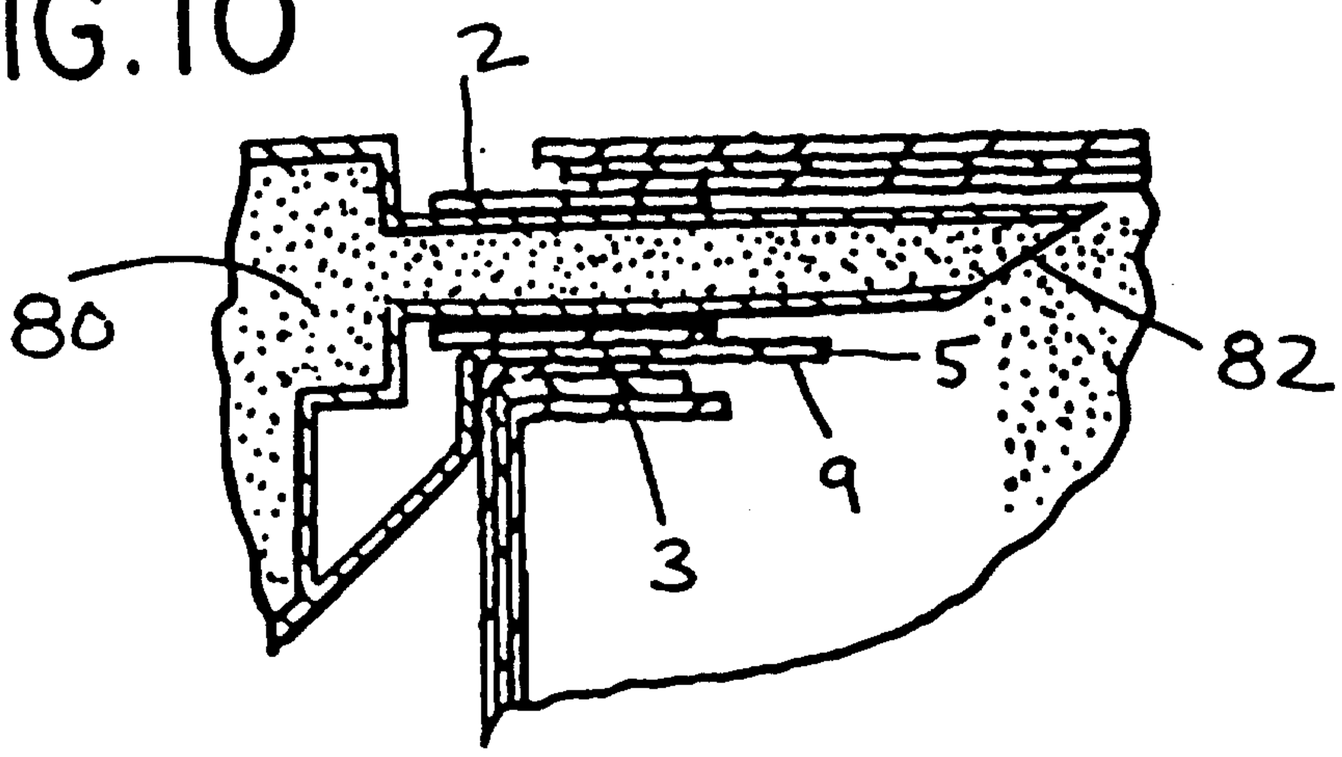


FIG. 11

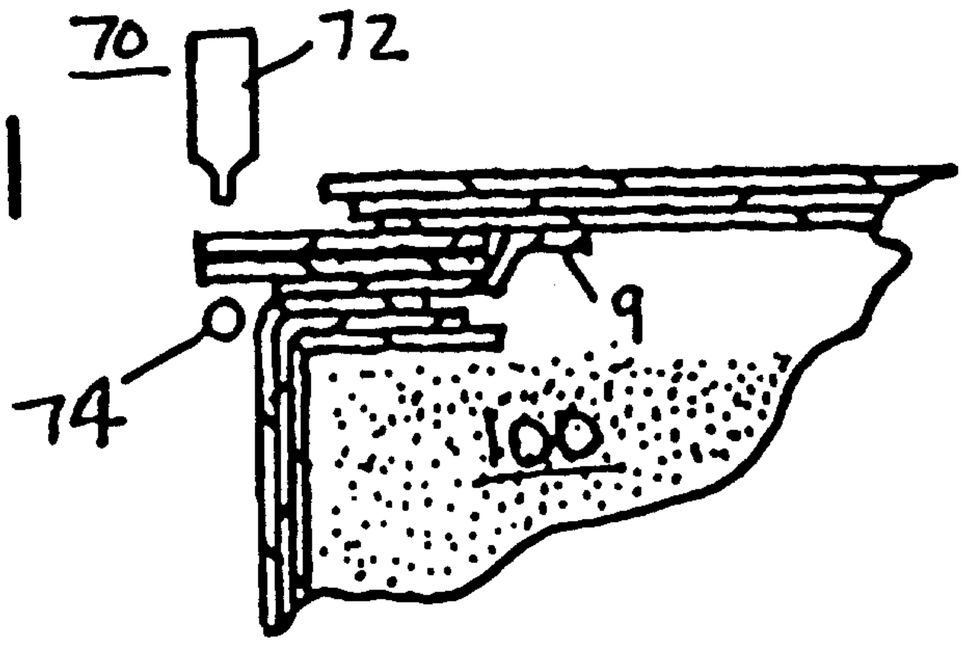


FIG. 12

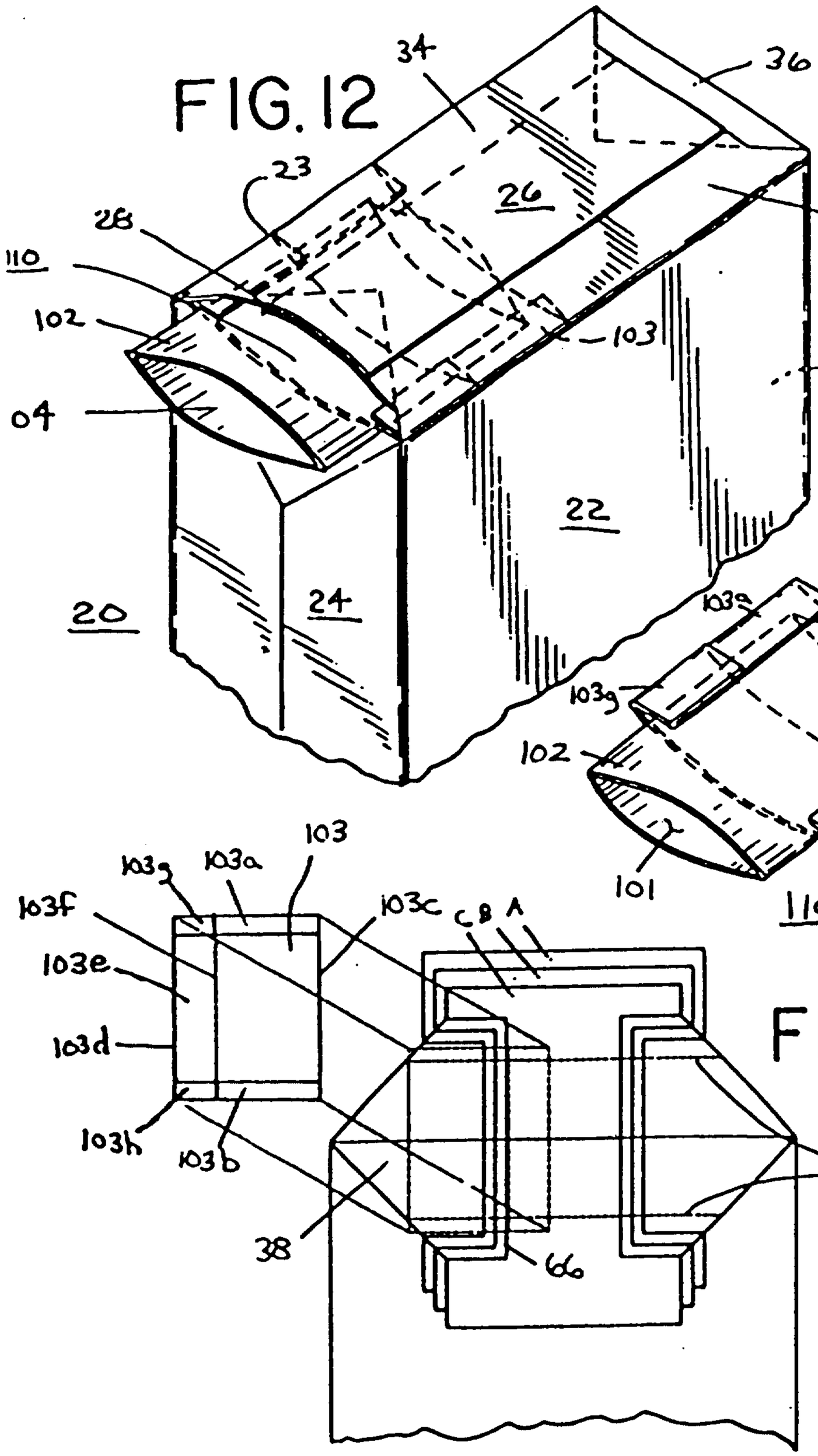


FIG. 12A

FIG. 13

FIG. 14

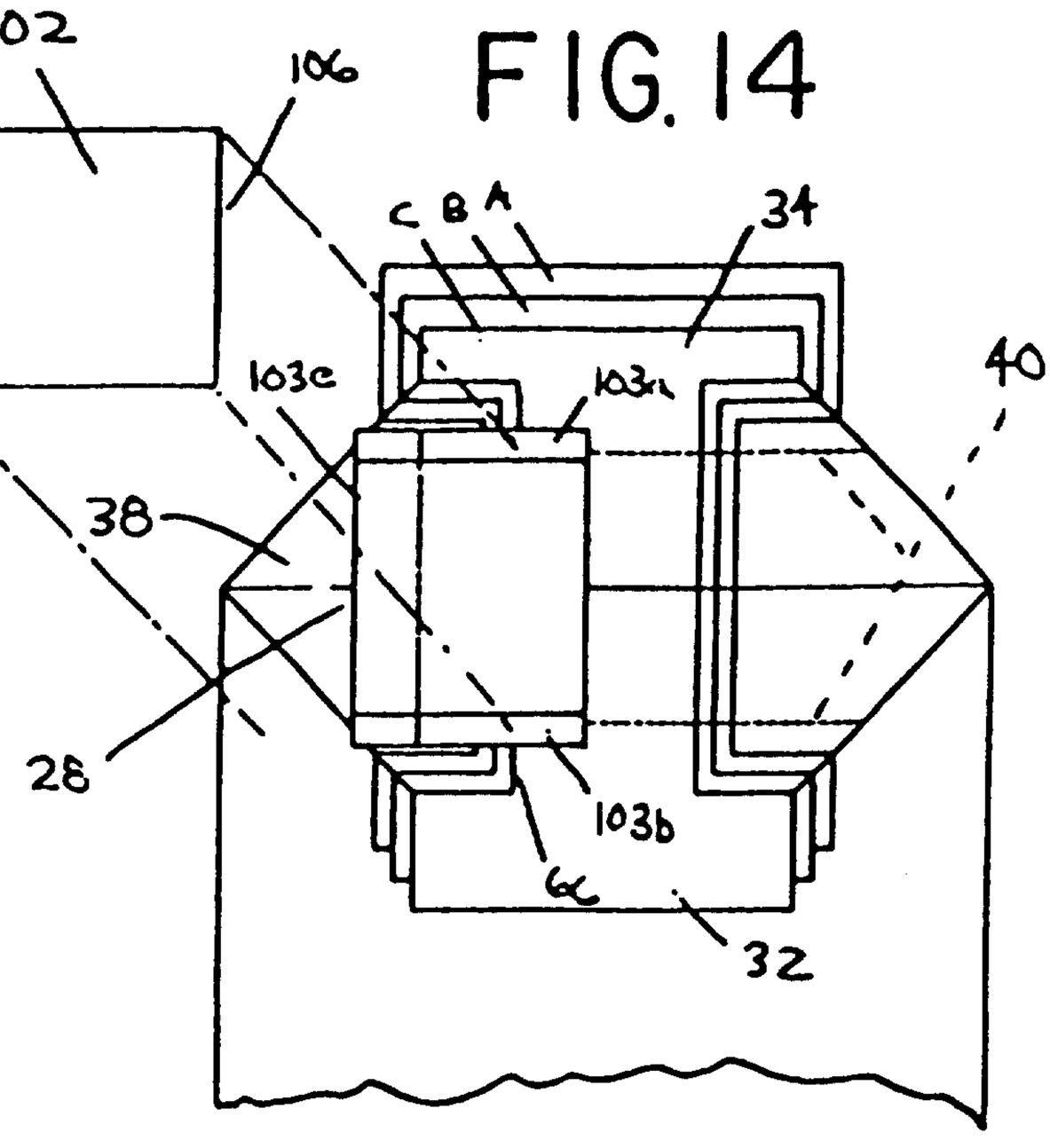

102
106
C B A
34
103c
103a
40
38
28
103b
66
32

FIG. 15

C
B
A
66
34
103a
10
102
38
109
103b
32

FIG.16

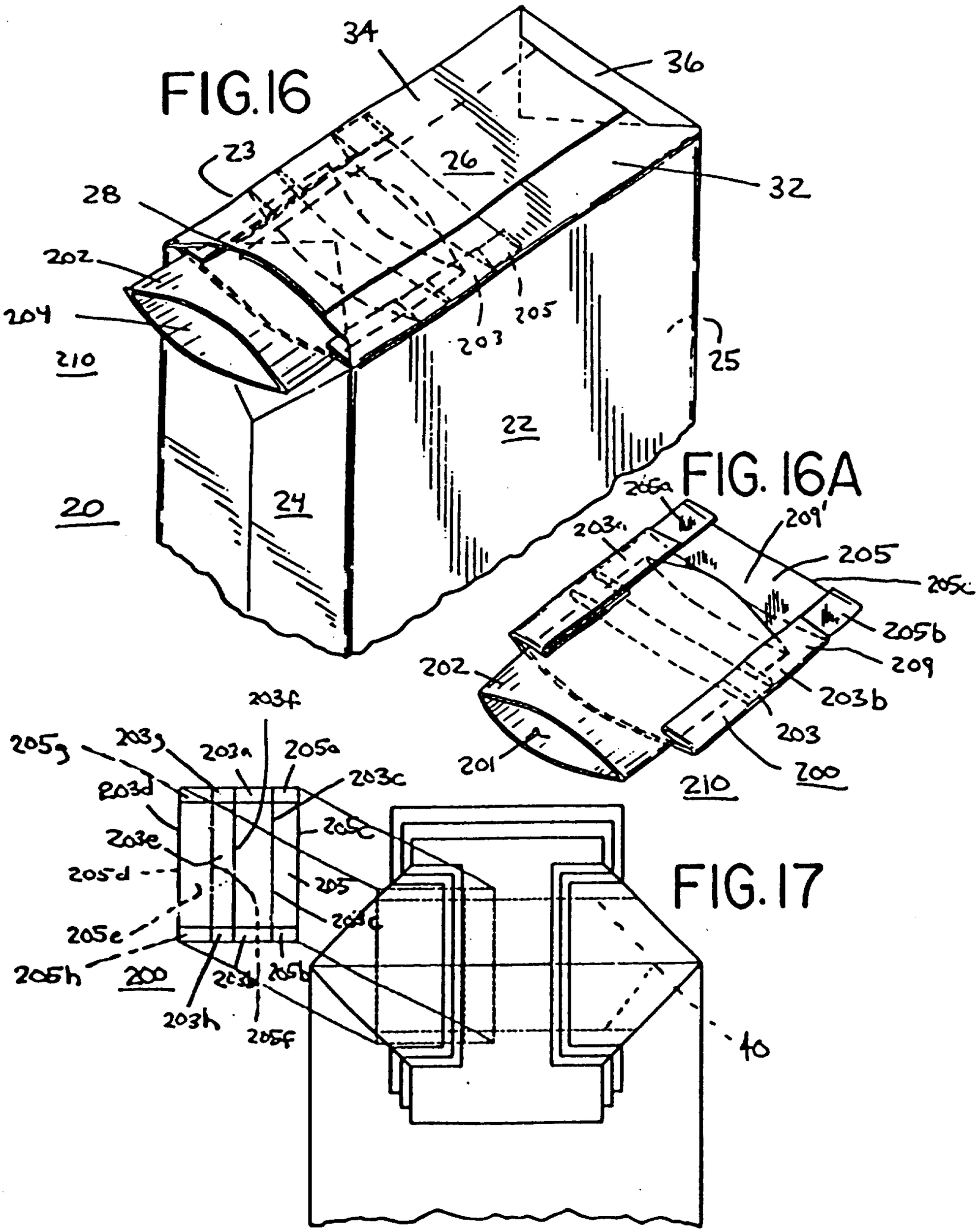


FIG. 16A

FIG.17

FIG. 18

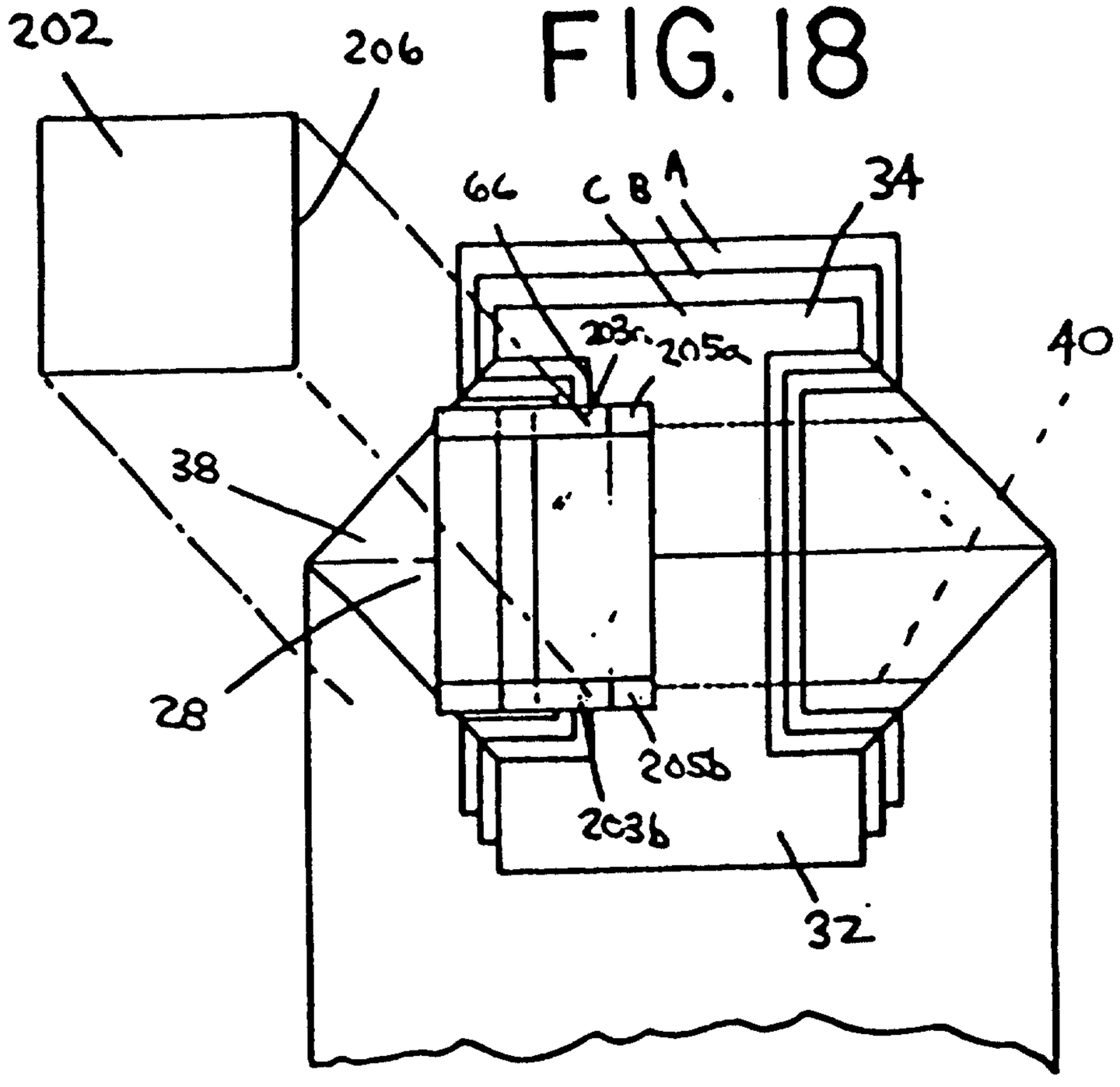
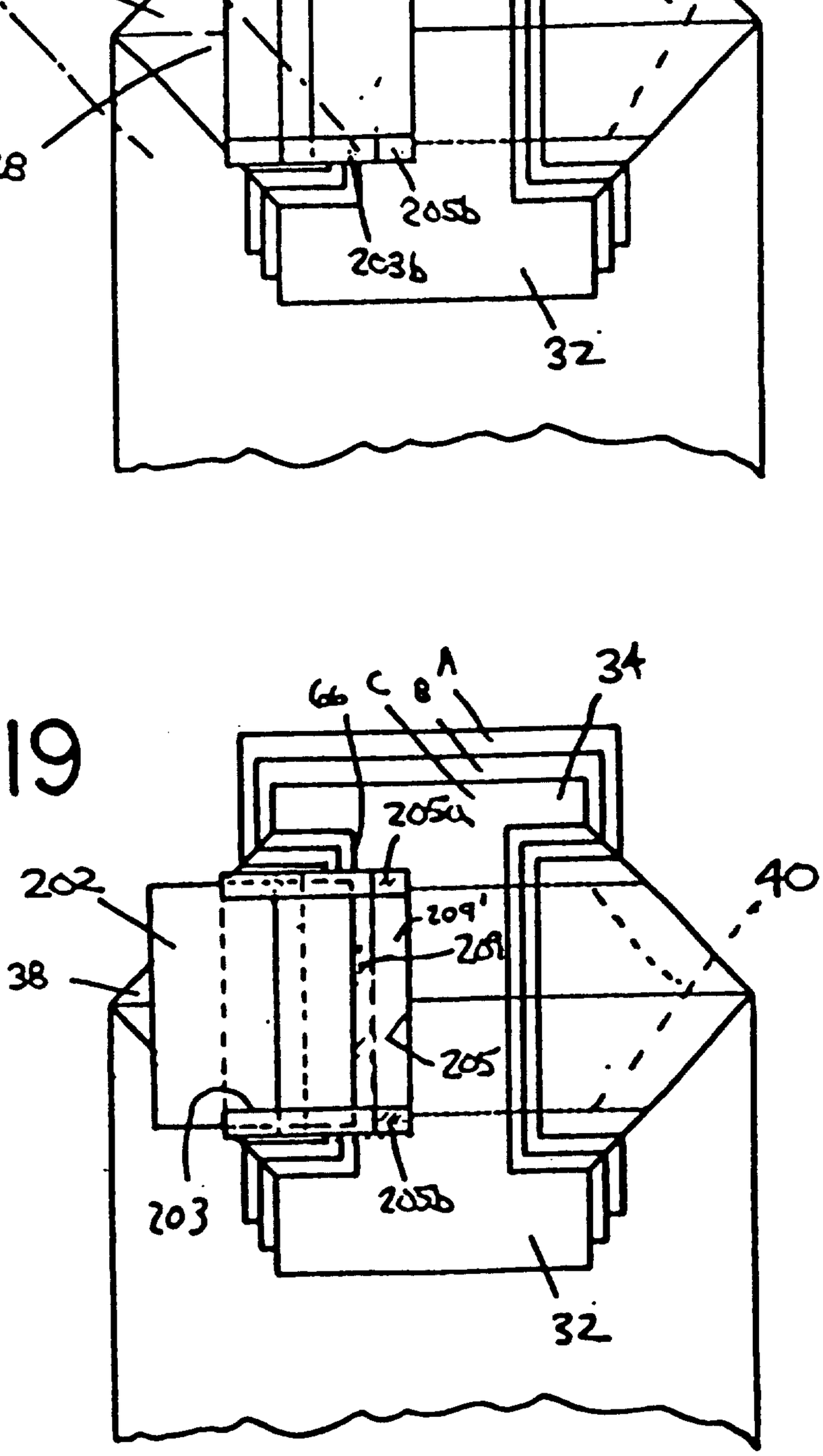
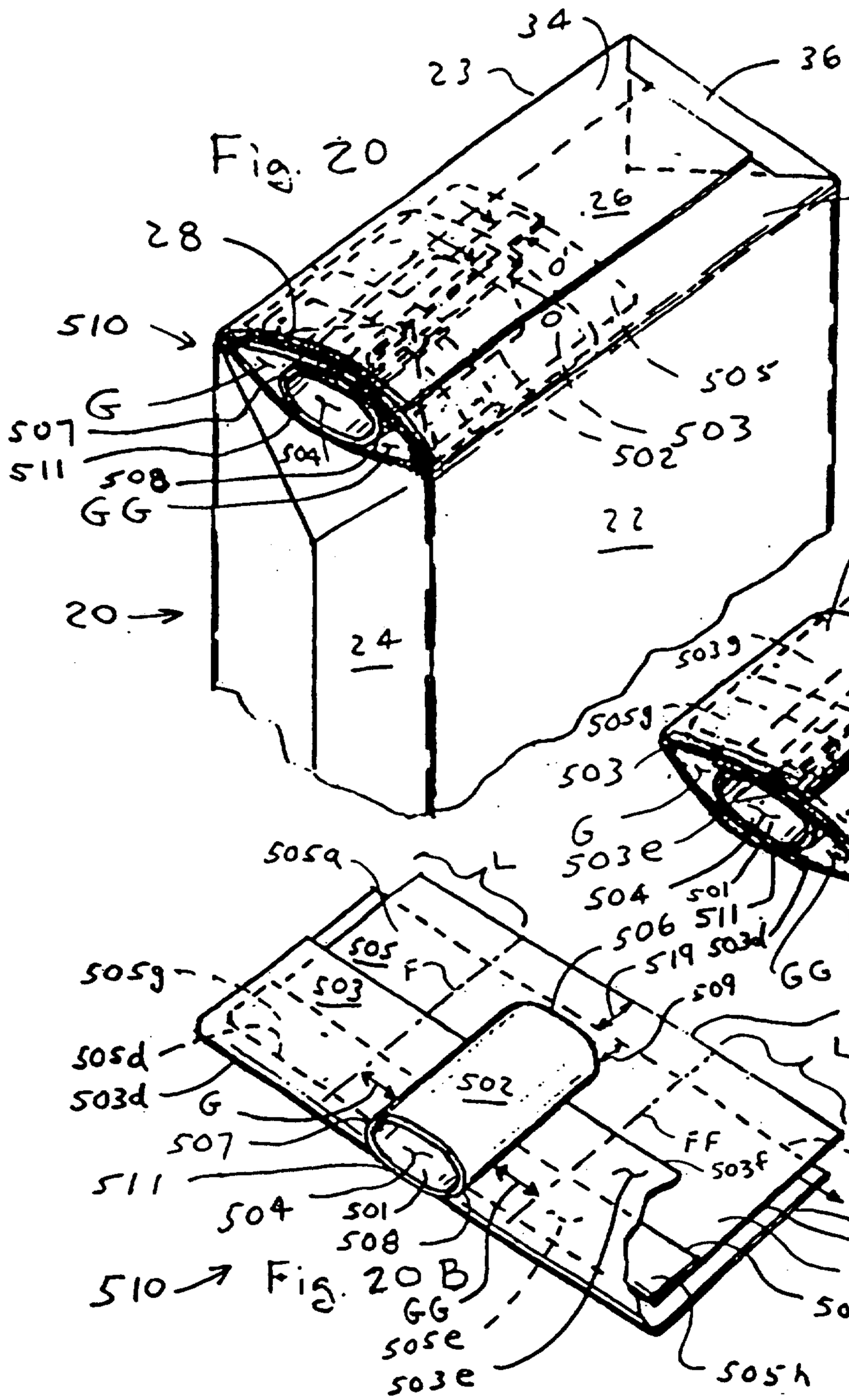

202
206
66
C
B
A
34
40
203a
205a
38
28
205b
203b
32

FIG. 19


66
C
B
A
34
205a
202
40
209'
209
38
205
203
205b
32


34
23
36
Fig. 20
26
28
32
10
510
505
G
503
507
502
511
508
504
GG
22
20
24

5039
505a
510
505c
503c
505b
519
503b
505
509
503f
505f
505h
505e
503
G
503e
504
501
511
506
503d
GG
Fig. 20A
505g
505
F
503
505d
502
507
FF
S
503i
505i
505b
505f
505h
510
Fig. 20B
GG
505e
503e