

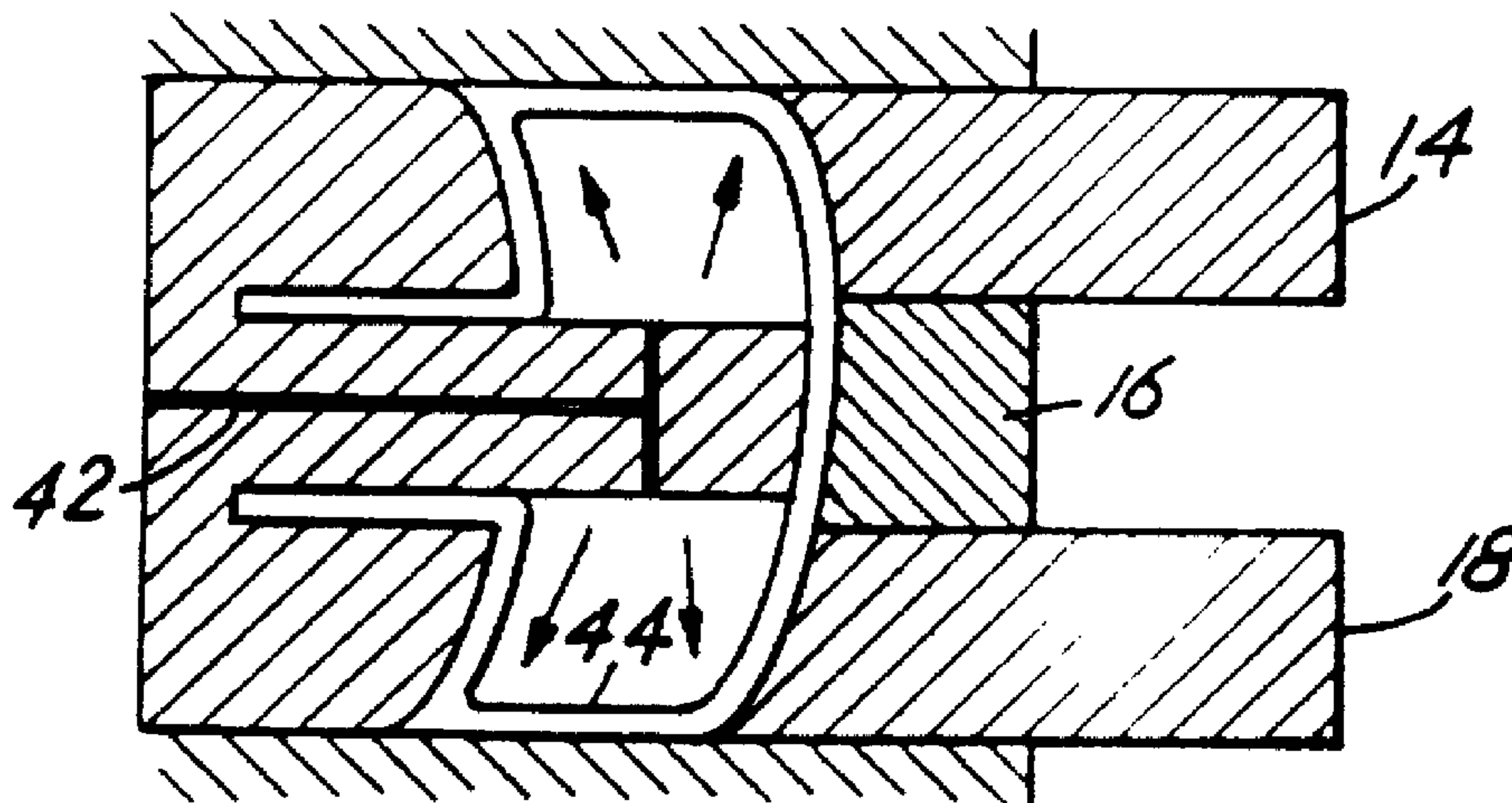


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(54) Title: METHOD AND APPARATUS FOR INJECTION BLOW MOLDING AN AUTOMOTIVE COMPONENT



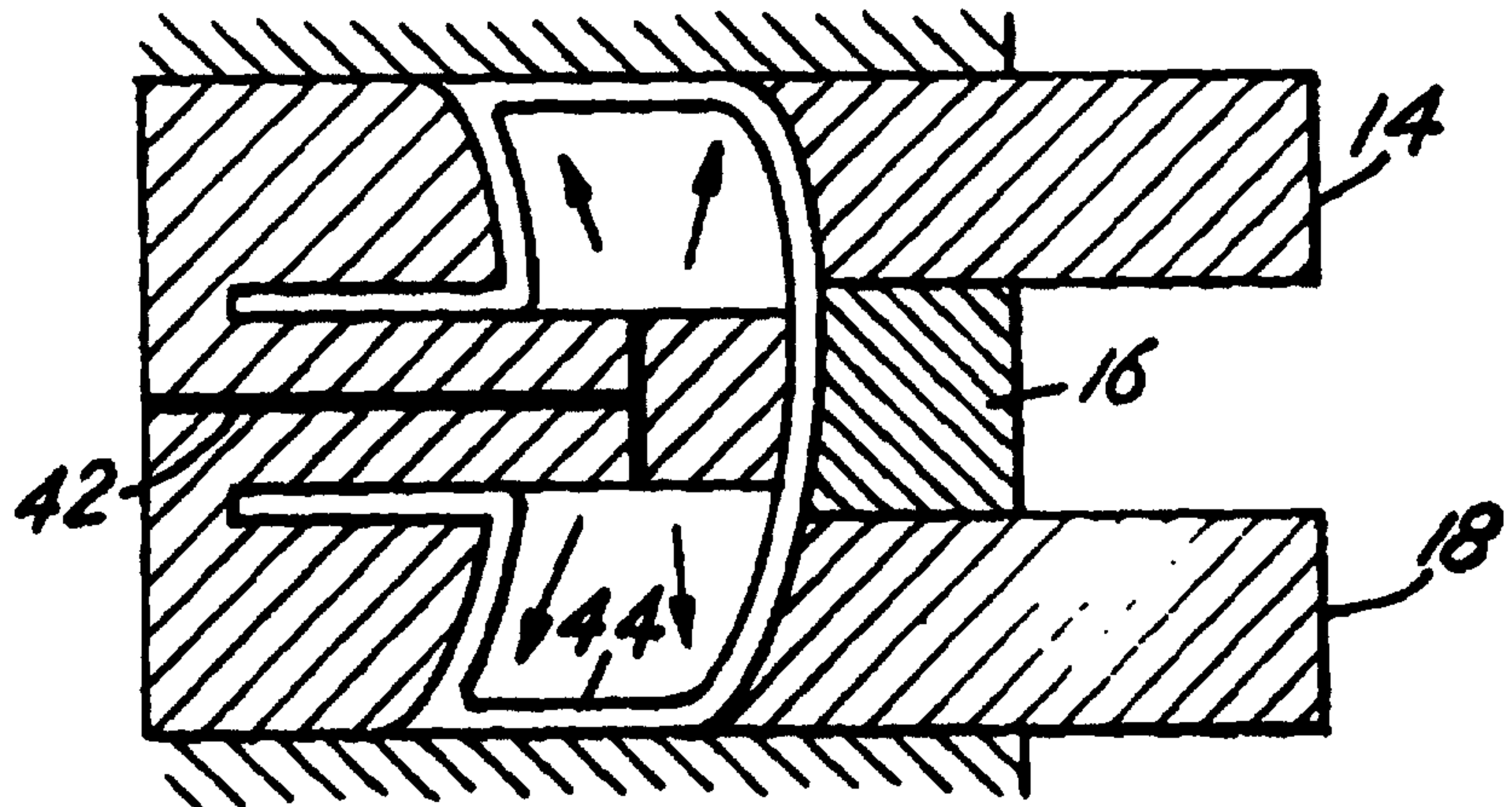
(57) Abrégé/Abstract:

A method and mold (10) for manufacturing a vehicle component such as a bumper beam (52) or body panel (62). The component is manufactured by: 1) injecting molten material into a parison cavity of a mold (10) to form a parison (40), wherein the mold has at least two sections (14, 18) that are moveable between a first position defining the parison cavity and an expanded second position defining predetermined blow cavities; 2) retracting the at least two sections (14, 18) to the expanded second position, and 3) injecting a gas into the parison (40) to expand the parison (40) to form blown part (44).

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(21) International Application Number: PCT/US99/08688 (22) International Filing Date: 21 April 1999 (21.04.99) (30) Priority Data: 60/082,617 22 April 1998 (22.04.98) US (63) Related by Continuation (CON) or Continuation-in-Part (CIP) to Earlier Application US 60/082,617 (CON) Filed on 22 April 1998 (22.04.98) (71) Applicant (for all designated States except US): CONIX CORPORATION [US/US]; Suite 1070, 16800 Executive Plaza Drive, Dearborn, MI 48126-6201 (US). (72) Inventor; and (75) Inventor/Applicant (for US only): PORTER, Marshall, Ray [US/US]; 21073 State Route 127, Nashville, IL 62263 (US). (74) Agent: BANNER & WITCOFF, LTD.; 13th floor, 10 S. Wacker Drive, Chicago, IL 60606 (US).		(81) Designated States: BR, CA, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i>
(54) Title: METHOD AND APPARATUS FOR INJECTION BLOW MOLDING AN AUTOMOTIVE COMPONENT (57) Abstract A method and mold (10) for manufacturing a vehicle component such as a bumper beam (52) or body panel (62). The component is manufactured by: 1) injecting molten material into a parison cavity of a mold (10) to form a parison (40), wherein the mold has at least two sections (14, 18) that are moveable between a first position defining the parison cavity and an expanded second position defining predetermined blow cavities; 2) retracting the at least two sections (14, 18) to the expanded second position, and 3) injecting a gas into the parison (40) to expand the parison (40) to form blown part (44).		



METHOD AND APPARATUS FOR INJECTION BLOW MOLDING AN AUTOMOTIVE COMPONENT

5 FIELD OF THE INVENTION

This invention relates to a method and apparatus for manufacturing an automotive component such as a bumper beam and body panel. In particular, this invention relates to a method and apparatus for manufacturing a relatively large one piece automotive component at a single station.

10

BACKGROUND OF THE INVENTION

Many automotive components can be manufactured using conventional injection blow molding or extrusion blow molding machines. However, certain body panels and bumper beams are generally too large for a single injection mold or a blow mold to
15 accommodate. Thus, such larger parts are required to be transferred from the injection station to the blow station. This transfer increases the amount of time required to manufacture a part, increases the risk of damage and reduces the efficiency of production.

SUMMARY OF THE INVENTION

20 The disadvantages of the prior art may be overcome by providing a method and apparatus for manufacturing an automotive component such as a bumper beam and body panel at a single station.

It is desirable to provide a method and apparatus for manufacturing a one piece decorative component which is structurally self-supporting.

25 It is desirable to provide a method and apparatus for manufacturing a one piece component, which apparatus can be retrofitted onto existing injection molding machines.

It is desirable to provide a method and apparatus for manufacturing a one piece component having visually smooth or class A surfaces.

According to one aspect of the invention, there is provided a mold having sections which are movable between a parison molding position and an expanded position. At the first stage, the sections cooperate to present a parison cavity for forming a parison. Molten material is injected into the parison cavity. The sections then retract to an expanded position. The parison is then blown forcing the material to expand to conform to the cavity in the expanded condition. Once the part is sufficiently solidified, the mold is opened and then the part is ejected.

DESCRIPTION OF THE DRAWINGS

- 10 In drawings which illustrate an embodiment of the invention,
- Figure 1 is a sectional view of a mold embodying the present invention, the mold in a parison forming condition;
- Figure 2 is sectional view of the mold of Figure 1, the mold in an expanded condition;
- 15 Figure 3 is a sectional view of mold of Figure 1 undergoing a blowing process; and
- Figure 4 is a sectional view of a finished part manufactured in accordance with the present invention.
- Figure 5 is a sectional view of a bumper beam manufactured in accordance with the present invention.
- 20 Figure 6 is a sectional view of a body panel manufactured in accordance with the present invention.
- Figure 7 is a flow chart showing one embodiment of steps in accordance with the method of the present invention.

DESCRIPTION OF THE INVENTION

25 The mold apparatus 10 is schematically illustrated in Figure 1. The mold 10 comprises a base 12, movable sections 14, 16 and 18 and side walls 20 and 22. The movable sections are typical injection mold sections which are constructed to be heated to about 85EC.

Base 12 has an anvil 24 which extends beyond molding surfaces 26 and 28. Extending into the base 12 from anvil 24 are two slots 30 and 32. Slots 30 and 32 join about the ends of anvil 24 to extend about the circumference of the base of the anvil 24.

Moveable sections 14 and 18 have respective end surfaces 36 and 38 which are shaped to be complementary with molding surfaces 26 and 28, respectively. Sections 14 and 18 are

constructed and arranged to slide relative to base 12 and along side walls 20 and 22, respectively between a parison forming condition (Figure 1) and an expanded condition (Figure 2). Sections 14 and 18 are spaced on opposite sides of anvil 24.

5 Section 16 has an end surface 34 which is shaped to be complementary to the distal end of anvil 24. Section 16 is spaced from the distal end of anvil 24.

When the sections 14, 16 and 18 are closed relative to the base 12 in the parison forming condition, slots 30 and 32 and the space between anvil 24 and the sections 14, 16 and 18 define a parison cavity. When sections 14 and 18 are retracted such that end surfaces 34, 36 and 38
10 form a continuous surface, the parison cavity is expanded defining blow cavities 46 on opposite sides of anvil 24. Blow cavities 46 are defined by molding surfaces 26 and 28, side walls 20 and 22 and end surfaces 34, 36 and 38.

At the first stage of manufacture, the sections 14, 16 and 18 cooperate to present a parison cavity for forming a parison 40. Molten plastic material is injected into the parison cavity in a
15 conventional manner well known in the art. The sections 14 and 18 then retract to an expanded position, presenting blow cavities 46. A pressurized gas, such as air or nitrogen, is then injected through passageway 42 in anvil 24. The parison 40 is then blown outwardly forcing the parison 40 to expand to conform to the cavity in the expanded condition. Once the blown part 44 is sufficiently solidified, the mold 10 is opened and then the part 44 is ejected.

20 Figures 5 and 6 illustrate a bumper beam and a body panel, respectively, manufactured in accordance with the present invention. The bumper beam 52 has been injection molded and includes a predetermined portion 54 that has been additionally blow-molded by retracting predetermined sections of the mold to form predetermined blow cavities and injecting a pressurized gas to force the predetermined portion 54 of the bumper beam 52 to take the shape
25 of the predetermined blow cavities. The body panel 62 has been injection molded and includes a predetermined portion 64 that has been additionally blow-molded by retracting predetermined sections of the mold to form predetermined blow cavities and injecting a pressurized gas to force the predetermined portion 64 of the bumper beam 62 to take the shape of the predetermined blow cavities.

30 Figure 7 is a flow chart showing one embodiment of steps in accordance with the method of the present invention. The steps include: A) injecting 72 molten material into a parison cavity of a mold to form a parison, wherein the mold has at least two sections that are moveable between a first position defining the parison cavity and an expanded second position defining

predetermined blow cavities; B) retracting 74 the at least two sections to the expanded second position; and C) injecting 76 a gas into the parison to expand the parison to conform to the expanded second position.

- 5 The above-described embodiment of the invention is intended to be an example of the present invention and alterations and modifications may be effected thereto, by those of skill in the art, without departing from the scope of the invention.

CLAIMS

What is claimed is:

- 5 1. A method for injection blow molding a vehicle component, comprising the steps of:
injecting molten material into a parison cavity of a mold to form a parison,
wherein the mold has a base and at least two mold sections that are movable relative to
the base between a first position defining the parison cavity and an expanded second
position defining predetermined blow cavities;
10 retracting the at least two mold sections to the expanded second position; and
injecting a gas into the parison to expand the parison to conform to the
predetermined blow cavities.
2. The method of claim 1 wherein the gas is one of air and nitrogen.
- 15 3. The method of claim 1 wherein the vehicle component is a component of one of:
an automobile, a truck, a van, and a sport utility vehicle.
4. The method of claim 3 wherein the component is one of a body panel and a bumper
20 beam.
5. A mold for injection blow molding a vehicle component wherein the mold has a base
and at least two mold sections that are moveable relative to the base between a first
position defining a parison cavity for injection molding and an expanded second position
25 defining predetermined blow cavities for blow molding, said predetermined blow cavities
having a shape conforming to an exterior shape of said vehicle component.
6. The mold of claim 5 wherein, when the at least two mold sections of the mold are in
the first position, the mold is utilized for injection molding by injecting molten material
30 into the parison cavity to form a parison, and, upon retraction of the at least two mold

sections to form the expanded second position, the mold is utilized for blow molding by injecting a gas into the parison to expand the parison to conform to the predetermined blow cavities defined by the expanded second position.

5 7. The mold of claim 6 wherein the gas is one of air and nitrogen.

8. The mold of claim 5 wherein the vehicle component is a component of one of: an automobile, a truck, a van, and a sport utility vehicle.

10 9. The mold of claim 5 wherein the vehicle component is one of a body panel and a bumper beam.

10. A mold as claimed in claim 5 wherein said base has an anvil, said anvil having a passageway for communicating with a source of pressurized gas, and said base has slots
15 merging with said anvil defining a portion of the parison cavity.

11. A mold as claimed in claim 10 wherein said base has side walls, and said at least two sections slide along said side walls.

20 12. A mold as claimed in claim 11 wherein said base has molding surfaces and each of said at least two sections are in the first position.

13. A mold as claimed in claim 12 wherein said complementary molding surfaces engage when said at least two sections are in the first position.

25

14. A method for injection blow molding a vehicle component, comprising the steps of:
injecting molten material into a parison cavity of a mold to form a parison,
wherein the mold has a least two mold sections that are moveable between a first position defining the parison cavity and an expanded second position defining predetermined

blow cavities, the at least two mold sections having end surfaces that are shaped to be complementary with molding surfaces of the parison cavity;

retracting the at least two mold sections to the expanded second position; and

5 injecting a gas into the parison to expand the parison to conform to the expanded second position.

15. The method of claim 14 wherein the gas is one of air and nitrogen.

10 16. The method of claim 14 wherein the vehicle component is a component of one of: an automobile, a truck, a van, and a sport utility vehicle.

17. The method of claim 16 wherein the component is one of: a body panel and a bumper beam.

15 18. A method for injection blow molding a vehicle component, comprising the steps of:

injecting molten material into a parison cavity of a mold to form a parison,
wherein the mold has at least one mold section that is moveable between a first position
defining the parison cavity and an expanded second position defining a predetermined
blow cavity, the at least one mold section having an end surface that is shaped to be
20 complementary with a molding surface of the parison cavity;

retracting the at least one mold section to the expanded second position; and

injecting a gas into the parison to expand the parison to conform to the expanded
second position.

25 19. The method of claim 18 wherein the gas is one of: air and nitrogen.

20. The method of claim 18 wherein the vehicle component is a component of one of: an automobile, a truck, a van, and a sport utility vehicle.

21. The method of claim 20 wherein the component is one of: a body panel and a bumper beam.

22. A method for injection blow molding a vehicle component, comprising the steps of:

5 injecting molten material into a parison cavity of a mold to form a parison,
wherein the mold has a least two mold sections that are moveable between a first position
defining the parison cavity and an expanded second position defining predetermined
blow cavities that form a vehicle component;

 retracting the at least two mold sections to the expanded second position; and
10 injecting a gas into the parison to expand the parison to conform to the expanded
second position to form the vehicle component.

23. The method of claim 22 wherein the gas is one of air and nitrogen.

15 24. The method of claim 22 wherein the vehicle component is a component of one of: an
automobile, a truck, a van, and a sport utility vehicle.

25. The method of claim 24 wherein the component is one of: a body panel and a
bumper beam.

20

26. A method for injection blow molding a vehicle component, comprising the steps of:

 injecting molten material into a parison cavity of a mold to form a parison,
wherein the mold has a least one mold section that is moveable between a first position
defining the parison cavity and an expanded second position defining a predetermined
25 blow cavity that forms a vehicle component;

 retracting the at least one mold section to the expanded second position; and

 injecting a gas into the parison to expand the parison to conform to the expanded
second position to form the vehicle component.

30 27. The method of claim 26 wherein the gas is one of: air and nitrogen.

28. The method of claim 26 wherein the vehicle component is a component of one of: an automobile, a truck, a van and a sport utility vehicle.
- 5 29. The method of claim 28 wherein the component is one of: a body panel and a bumper beam.

FIG.1

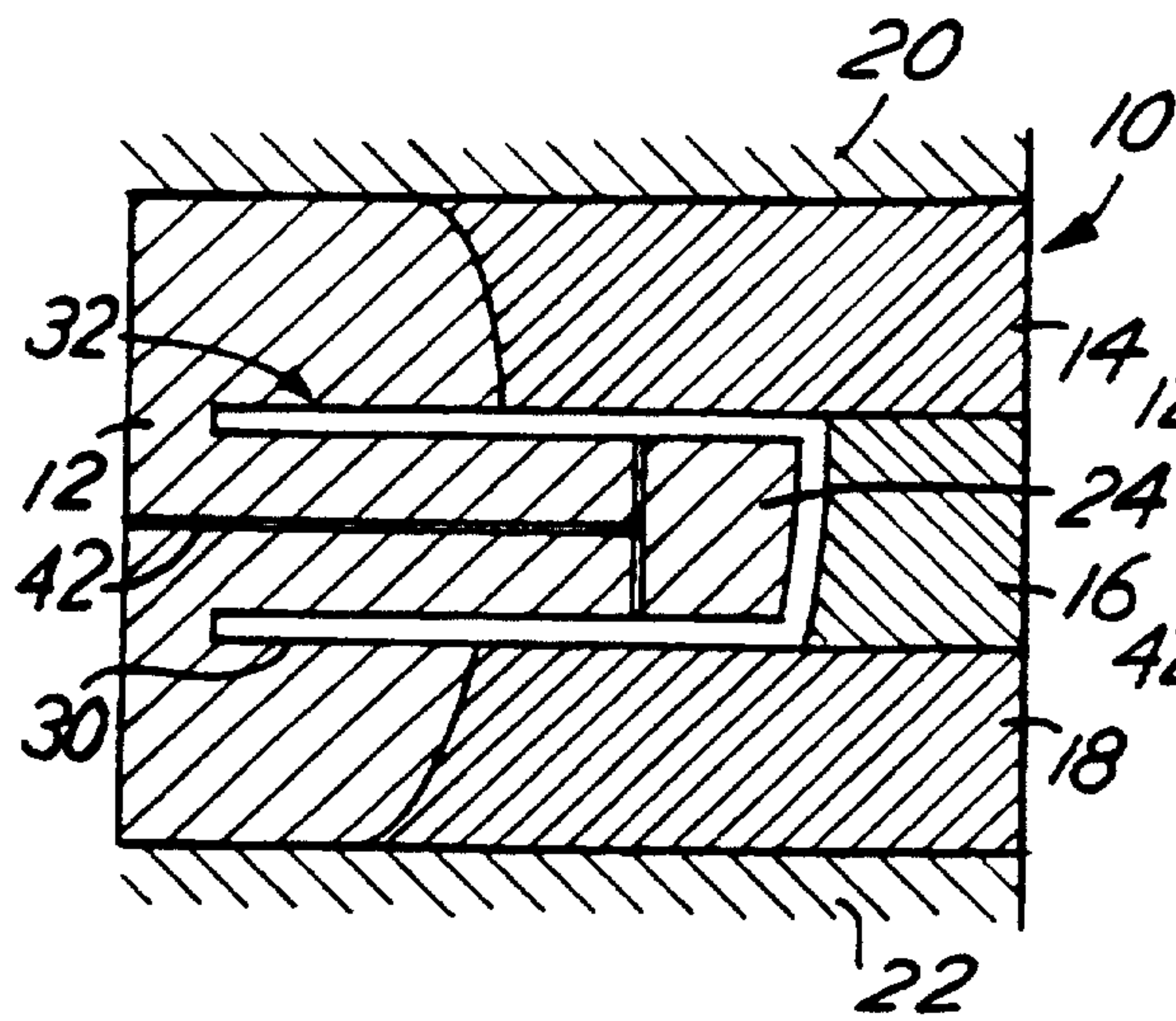


FIG.2

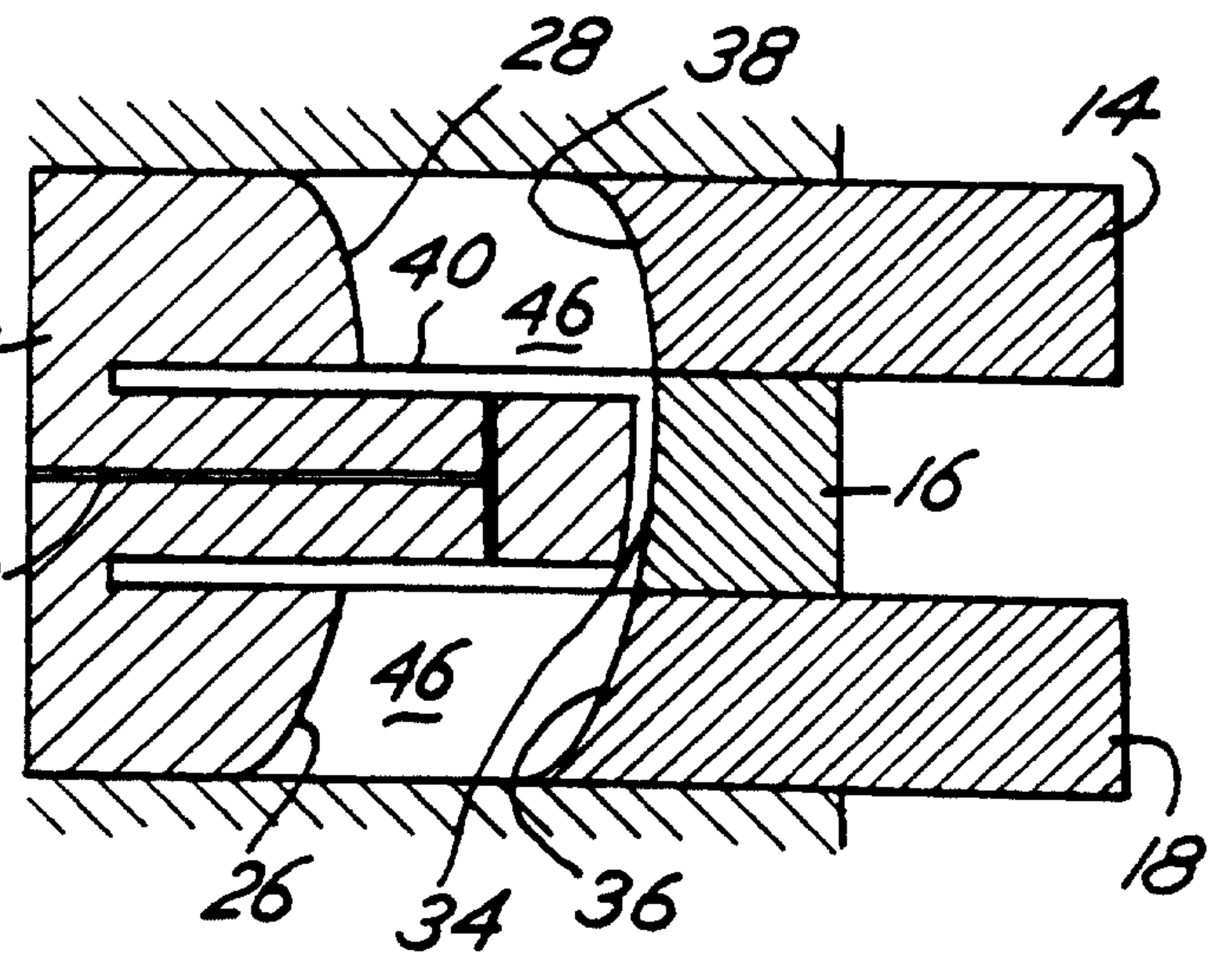


FIG. 3

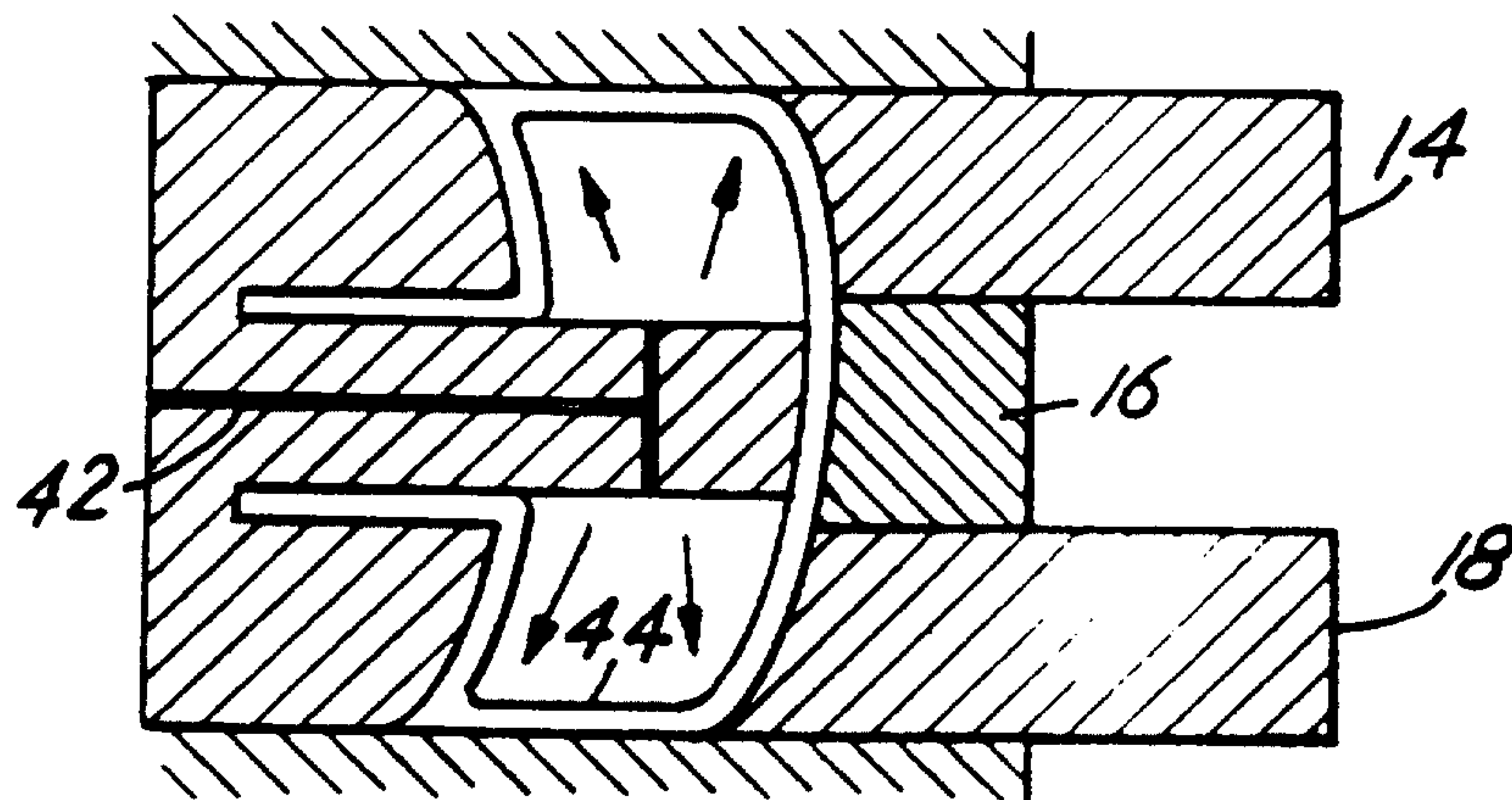


FIG.4

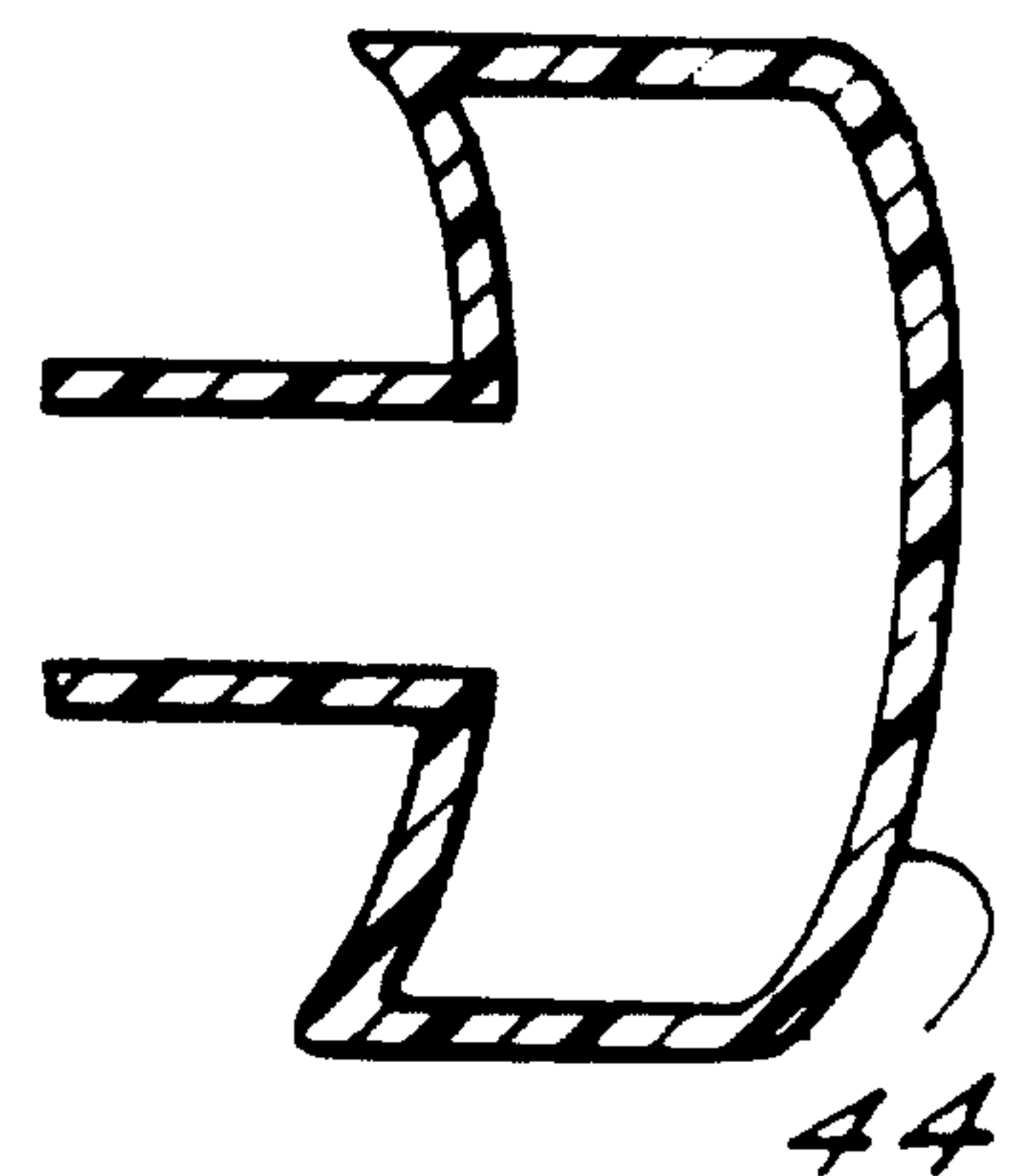


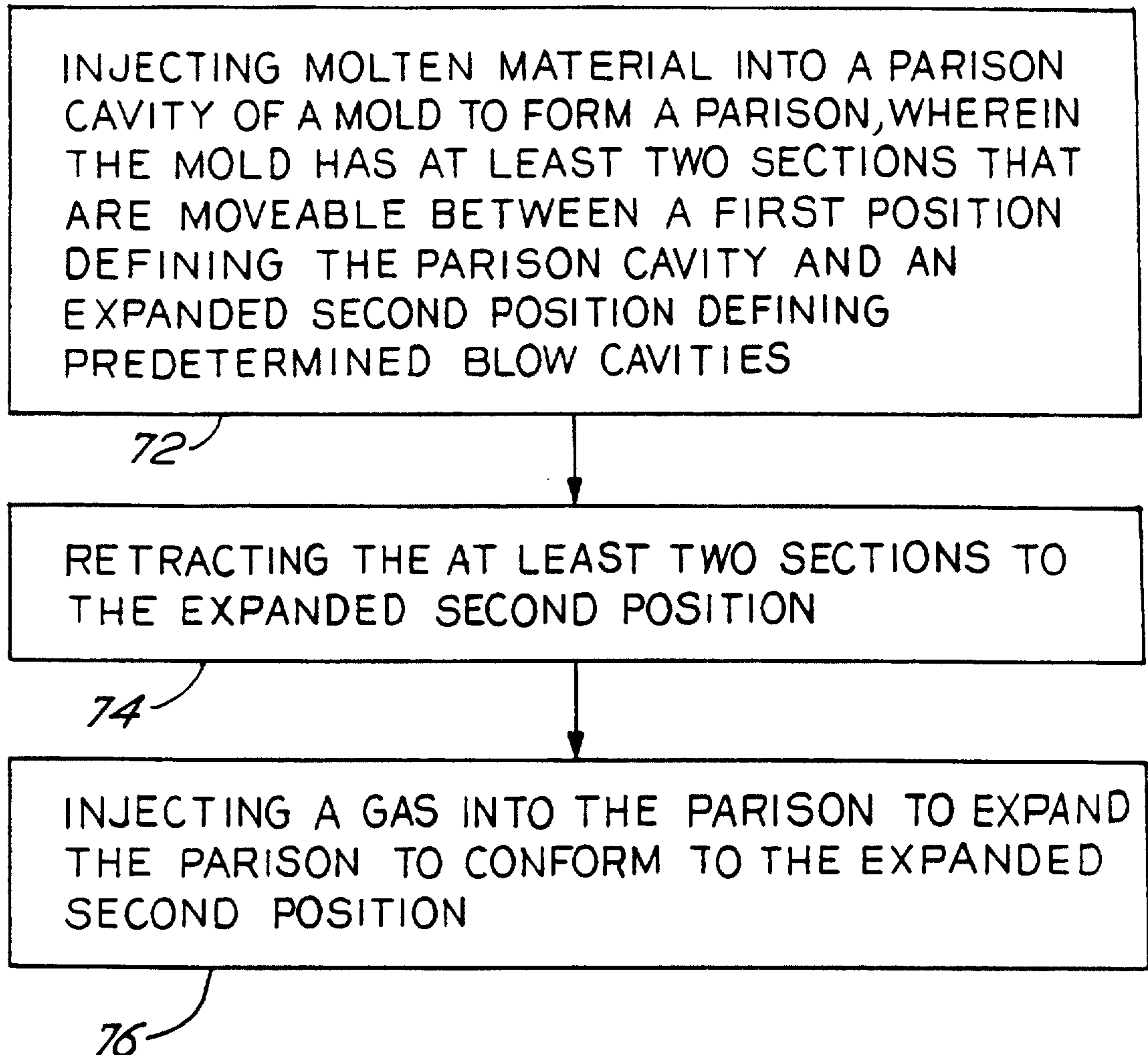
FIG.7

FIG. 5

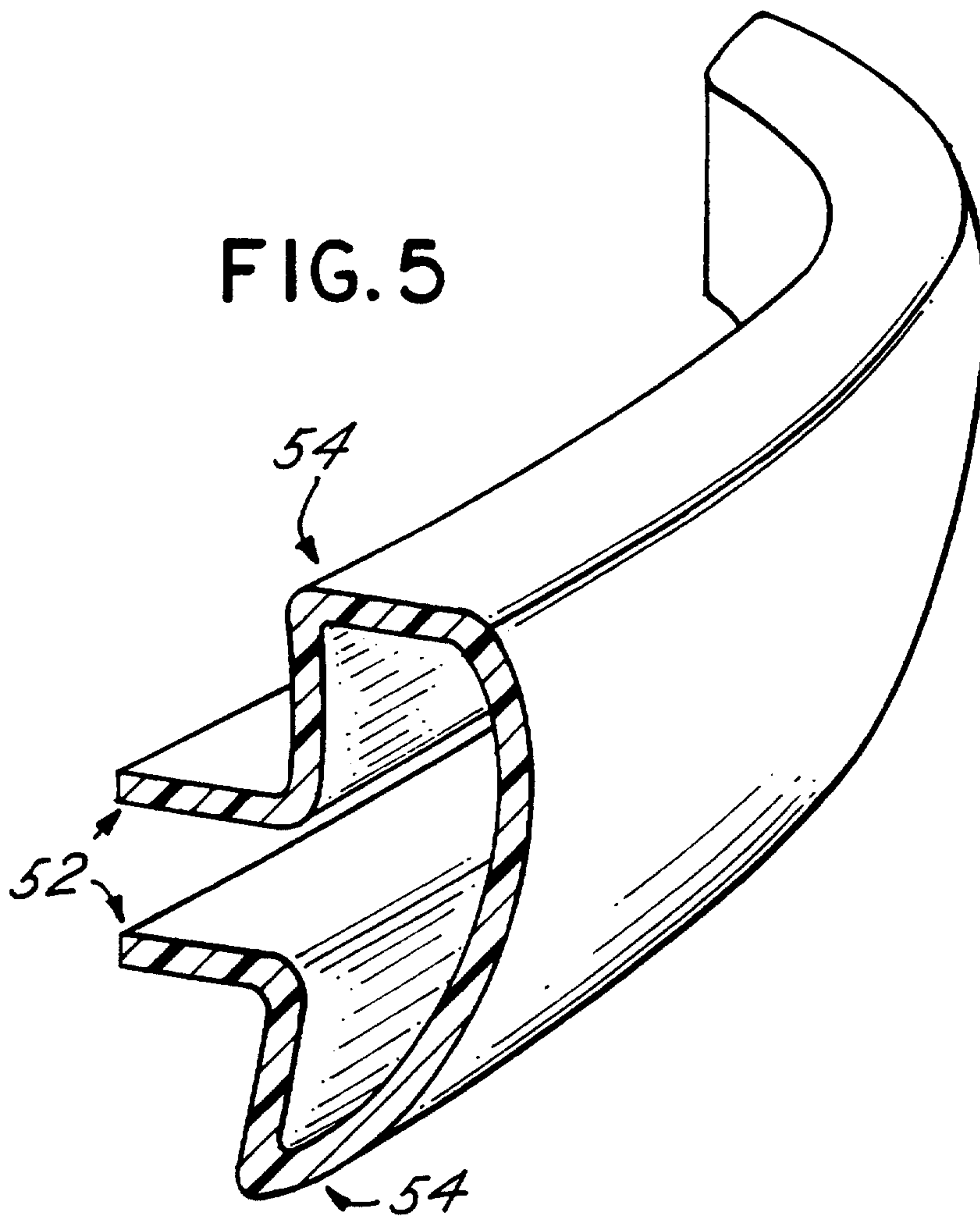


FIG. 6

