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NOTE: The country must be indicated by its International Abbreviation - see schedule 4 of the Regulations

54	TITLE OF INVENTION

WC pan connector

57	ABSTRACT (NOT MORE THAN 150 WORDS)

NUMBER OF SHEETS	22

The sheet(s) containing the abstract is/are attached.

If no classification is furnished, Form P.9 should accompany this form.
The figure of the drawing to which the abstract refers is attached.

A&A P208

Abstract

A WC pan connector comprises a housing defining a throughbore and having an inlet adapted to be connected to an outlet from a WC, and an outlet adapted to be connected to the inlet of a soil pipe. The connector also includes a sealing element for forming a seal between the housing and the WC outlet and a sealing element retaining member adapted to engage a portion of the sealing element and retain the sealing element in a preferred configuration.

NcAlpine & Company Limited

Figure for publication

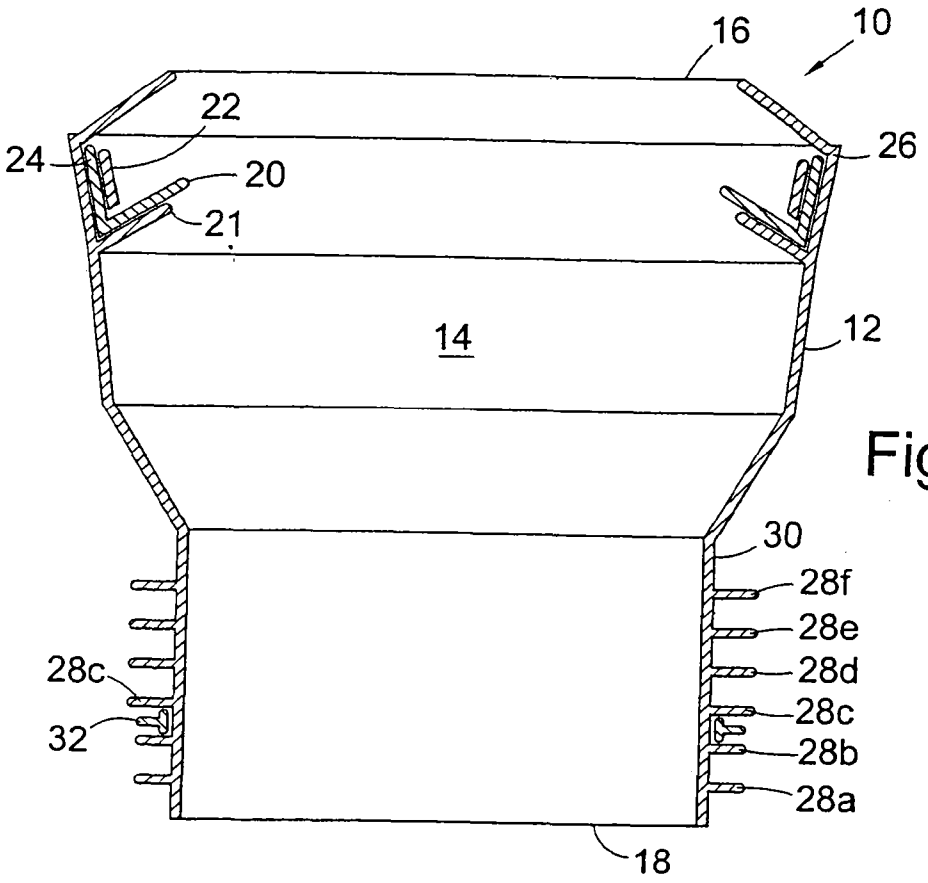

Fig. 2

WC Pan Connector

FIELD OF THE INVENTION

This invention relates to connectors for connecting a WC pan to a soil pipe, particularly, but not exclusively, to flexible WC pan connectors.

BACKGROUND OF THE INVENTION

Forming and maintaining a tight seal between the pan of a WC and a soil pipe is crucial. If this seal leaks due to poor design or installation then waste products can leak from the WC into the surrounding environment.

A wide range of connectors are available. One of the more popular types is the flexible connector. Flexible connectors are popular because one size of flexible connector can "fit" a number of different sizes of pan outlet and soil pipe inlet.

Conventional flexible connectors have drawbacks, however; for example because of their flexible nature, the pan can be introduced into the connector without the WC outlet being exactly aligned with the connector, that is to say the toilet may be canted to one side and introduced gradually into the connector. Whilst the ability to introduce the pan gradually into the connector assists in installation, part of the sealing element,

which forms the seal between the connector and the WC pan, can be pulled away from the connector wall, which may lead to leakage problems.

A further drawback of conventional flexible connectors has been the difficulty in forming a seal with soil pipe. Generally ribs are provided on the external surface of the connector between which sealing rings are placed. To obtain a tight seal a number of these rings are required adding to the cost of the finished product.

It is an object of embodiments of the present invention to provide a WC pan connector which overcomes at least one of the problems associated with the prior art.

SUMMARY OF THE INVENTION

According to a first aspect of the present invention there is provided a WC pan connector comprising:

a housing defining a throughbore, the housing having an inlet adapted to be connected to an outlet from a WC, and an outlet adapted to be connected to the inlet of a soil pipe;

a sealing element for forming a seal between the housing and the WC outlet; and

a sealing element retaining member adapted to engage a portion of the sealing element and retain the sealing element in a preferred configuration.

The sealing element retaining member acts to retain the sealing element in a preferred configuration, even when the WC outlet and the connector inlet are misaligned as the WC outlet is inserted into the connector.

Preferably, the seal element retaining member is a resilient member. The resilient member may be biased to retain the sealing element in a preferred configuration.

The housing may be flexible. The housing may be made from a polymeric material. Preferably, the housing is made from ethyl vinyl acetate (EVA). Polymeric materials, particularly EVA lend themselves to cost effective manufacturing techniques such as injection moulding.

The WC pan connector may be sufficiently flexible to be useable with a range of sizes of WC pan outlets and/or a range of sizes of soil pipe inlet. A connector which can be used with a range of WCs and soil pipes reduces the amount of stock suppliers need to hold.

Preferably, the resilient member is a ring shaped member. The ring shaped member may be a spilt ring. Alternatively, the ring shaped member may be formed from a compression spring.

Preferably, the split ring is made from a polymeric material. Alternatively, the split ring is made from spring steel. Indeed the split ring may be made from any suitable resilient material.

Most preferably, the resilient member is an acetal (polyoxymethylene) split ring. Acetal split rings are reliable and have relatively low manufacturing costs.

Preferably, the sealing element is a ring shaped seal. The seal may have a WC pan engaging portion and a housing engaging portion.

Preferably, the resilient member engages the housing engaging portion. The sealing element may have an "L" cross-section.

Preferably, the housing further includes a sealing element support extending from an internal wall of the housing.

Preferably, at least the pan engaging portion of the sealing element is sufficiently flexible to be useable with and form a seal against a range of sizes of WC pan outlets. The seal element may be an elastomeric seal element. An elastomeric seal will generally be ideal for forming a tight seal with any one of a range of sizes of WC pan outlets.

Preferably, the WC pan connector outlet is adapted to be connected to the inlet of a soil pipe by at least

one circumferential rib extending from an external surface of the housing adjacent the outlet.

Preferably, there is a plurality of circumferential ribs extending from the external surface of the housing adjacent the outlet, adjacent ribs being spaced sufficiently apart from one another to receive a soil pipe seal.

The at least one rib may be deformable. Having deformable ribs means the WC pan connector is useable with a range of sizes of soil pipe inlet.

The WC pan connector may further include a soil pipe seal located between a pair of adjacent ribs. A soil pipe seal is provided to form a primary seal between the connector and the soil pipe inlet.

Preferably, the soil pipe seal is a circular seal. The soil pipe seal may be flexible. Most preferably, the soil pipe seal is an elastomeric ring seal. An elastomeric seal will generally be ideal for forming a tight seal with any one of a range of sizes of soil pipe inlets.

The soil pipe seal may have a portion which abuts one of the adjacent circumferential ribs. In this case, the soil pipe seal portion may abut the further of the two ribs from the connector outlet.

The portion of the soil pipe seal may have a diameter less than or equal to the adjacent ribs. Using a seal which has diameter less than or equal to the adjacent ribs permits a secondary seal to be formed between the ribs and the soil pipe.

Preferably, the circumference of the ribs is substantially constant or increases with distance from the connector outlet.

Preferably, there are two or three ribs. Alternatively, there are more than two or three ribs. Having, for example, six ribs increases the cost of manufacture but has the advantage of increasing the fitting length of the WC pan connector.

By virtue of the above a WC can be sealed to a soil pipe by a WC pan connector, which provides increased reliability of sealing.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will now be described, by way of example, with reference to the accompanying figures in which:

Figure 1 is a side view of a WC pan connector in accordance with a preferred embodiment of the present invention;

Figure 2 is a cross-sectional view of Figure 1;

Figure 3 is a plan view of the acetal split ring of Figure 2; and

Figure 4 is a cross-sectional view of Figure 1 with the WC pan connector connected to a WC and a soil pipe.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring firstly to Figure 1 there is shown a side view of a WC pan connector, generally indicated by reference numeral 10, in accordance with a preferred embodiment of the present invention. The WC connector 10 is intended to form a sealed connection between the outlet of the WC and the inlet of a soil pipe (not shown).

The structure of the WC pan connector 10 can be best seen in Figure 2 which is a cross sectional view of Figure 1. The WC pan connector 10 comprises an EVA housing 12 defining a throughbore 14 with an inlet 16 and an outlet 18. The inlet 16 is adapted to be connected to the outlet of a WC pan connector (not shown) and the outlet 18 is adapted to be connected to the inlet of a soil pipe (not shown). The pan connector 10 further includes an elastomeric ring seal 20 resting on sealing element support 21 for forming a seal between the housing 12 and the WC outlet (not shown). The pan connector further includes a ring seal retaining member 22 in the

form of a resilient split ring of acetal which engages a portion 24 of the elastomeric ring seal 20 and is biased to retain the elastomeric ring seal 20 in a preferred configuration, in this case maintaining contact between the elastomeric ring seal 20 and the internal wall 26 of the housing 12.

The resilient acetal split ring 22 can be seen in plan view in Figure 3.

Referring back to Figure 2 the connector outlet 18 is adapted to be connected to the inlet of a soil pipe (not shown) by means of six circumferential ribs 28a-f. The ribs 28a-f extend from the external surface 30 of the housing 12 adjacent the outlet 18. As can be seen from Figure 2 the circumference of the first and second ribs 28a,b is less than the circumference of the third, fourth, fifth and sixth ribs, 28c-f. The reduced circumference of the first and second ribs 28a,28b assists in guiding the housing outlet 18 into a soil pipe (not shown).

The WC pan connector 10 further includes an elastomeric soil pipe "T" seal 32 located between the second and third ribs 28b,28c. It will be noted from Figure 2 that the elastomeric soil pipe seal 32 is a ring seal and has a diameter substantially the same as that of

the third circumferential rib 28c, the purpose of this feature will be discussed in connection with Figure 4.

Referring now to Figure 4, a cross sectional view of Figure 1 with the WC pan connector 10 connected to a WC outlet 40 and a soil pipe 50. As can be seen the WC outlet 40 has been pushed through the inlet 16 of the pan connector 10 and deformed the tip 36 of the elastomeric ring seal 20 to form a seal. The presence of the resilient acetal split ring 22 has, however, maintained contact between the portion 24 of the elastomeric ring seal 20 and the internal wall 26 of the housing 12.

As can also be seen from Figure 4, the third, fourth, fifth and sixth circumferential ribs 28c-f have all been deflected at their respective end points 38 as has the tip 42 of the elastomeric soil pipe seal 32. The primary seal between the connector housing 12 and the soil pipe 50 is made by the tip 42 of the elastomeric soil pipe seal 32, however, secondary seals are formed at the end points 38 of the third, fourth, fifth and sixth circumferential ribs 28c-f.

Various modifications and improvements may be made to the embodiments hereinbefore described without departing from the scope of the invention. For example, it will be understood that any suitable resilient member could be used, such as spring steel, or a compression

spring formed into a ring. Similarly, although the resilient element is shown as a discrete unit, it could be formed integrally with the internal wall of the housing. In a further alternative, the soil pipe seal could have an inverted "L" cross-section, one leg of "L" abutting the external surface 30 of the housing and the other leg of the "L" abutting a surface of an adjacent rib. It will also be understood that although there are six ribs shown in the figures, fewer ribs could be used, and the soil pipe seal could be located between, for example, the fourth and fifth ribs 28d,28e.

Those of skill in the art will also recognise that the above described embodiment of the invention provides a WC pan connector by which a WC can be sealed to a soil pipe, which provides increased reliability of sealing.

Claims

1. A WC pan connector comprising:

a housing defining a throughbore, the housing having an inlet adapted to be connected to an outlet from a WC, and an outlet adapted to be connected to the inlet of a soil pipe;

a sealing element for forming a seal between the housing and the WC outlet; and

a sealing element retaining member adapted to engage a portion of the sealing element and retain the sealing element in a preferred configuration.

2. The WC pan connector of claim 1, wherein the seal element retaining member is a resilient member.

3. The WC pan connector of claim 2, wherein the resilient member is biased to retain the sealing element in a preferred configuration.

4. The WC pan connector of any preceding claim, wherein the housing is flexible.

5. The WC pan connector of any preceding claim, wherein the housing is made from a polymeric material.

6. The WC pan connector of any preceding claim, wherein the housing is made from ethyl vinyl acetate.

7. The WC pan connector of any preceding claim, wherein the WC pan connector is sufficiently flexible to be useable with a range of sizes of WC pan outlets and/or a range of sizes of soil pipe inlet.

8. The WC pan connector of any preceding claim, wherein the retaining member is a ring shaped member.

9. The WC pan connector of claim 8, wherein the ring shaped member is a spilt ring.

10. The WC pan connector of claim 8, wherein the ring shaped member is formed from a compression spring.

11. The WC pan connector of claim 9, wherein the split ring is made from a polymeric material.

12. The WC pan connector of claim 9, wherein the split ring is made from spring steel.

13. The WC pan connector of claim 8, wherein the resilient member is an acetal (polyoxymethylene) split ring.

14. The WC pan connector of any preceding claim, wherein the sealing element is a ring shaped seal.

15. The WC pan connector of any preceding claim, wherein the seal has a WC pan engaging portion and a housing engaging portion.

16. The WC pan connector of claim 15, wherein the resilient member engages the housing engaging portion.

17. The WC pan connector of any preceding claim, wherein the sealing element has an "L" cross-section.

18. The WC pan connector of any preceding claim, wherein the housing further includes a sealing element support extending from an internal wall of the housing.

19. The WC pan connector of claim 15, wherein at least the pan engaging portion of the sealing element is sufficiently flexible to be useable with and form a seal against a range of sizes of WC pan outlets.

20. The WC pan connector of any preceding claim, wherein the seal element is an elastomeric seal element.

21. The WC pan connector of any preceding claim, wherein the WC pan connector outlet is adapted to be connected to the inlet of a soil pipe by at least one circumferential rib extending from an external surface of the housing adjacent the outlet.

22. The WC pan connector of claim 21, wherein there is a plurality of circumferential ribs extending from the external surface of the housing adjacent the outlet, adjacent ribs being spaced sufficiently apart from one another to receive a soil pipe seal.

23. The WC pan connector of either of claims 21 or 22, wherein the at least one rib is deformable.

24. The WC pan connector of any preceding claim, wherein the WC pan connector further includes a soil pipe seal located between a pair of adjacent ribs.

25. The WC pan connector of claim 24, wherein the soil pipe seal is a circular seal.

26. The WC pan connector of either of claims 24 or 25, wherein the soil pipe seal is flexible.

27. The WC pan connector of any of claims 24 to 26, wherein the soil pipe seal is an elastomeric ring seal.

28. The WC pan connector of any of claims 24 to 27, wherein the soil pipe seal has a portion which abuts one of the adjacent circumferential ribs.

29. The WC pan connector of claim 28, wherein the portion of the soil pipe seal may have a diameter less than or equal to the adjacent ribs.

30. The WC pan connector of claim 22, wherein the circumference of the ribs is substantially constant or increases with distance from the connector outlet.

31. The WC pan connector of either of claims 22 or 30, wherein there are two or three ribs.

32. A pan connector according to any one of claims 1 to 31, substantially as herein described and illustrated.

33. A new pan connector, substantially as herein described.

Dated this 28th day of October 2005

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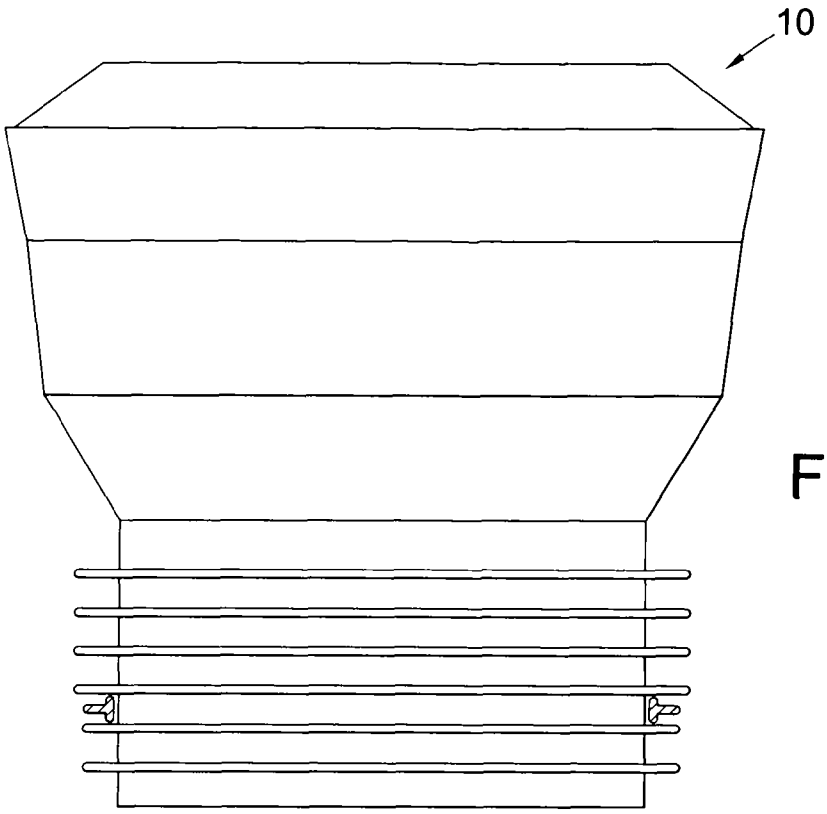

Fig. 1

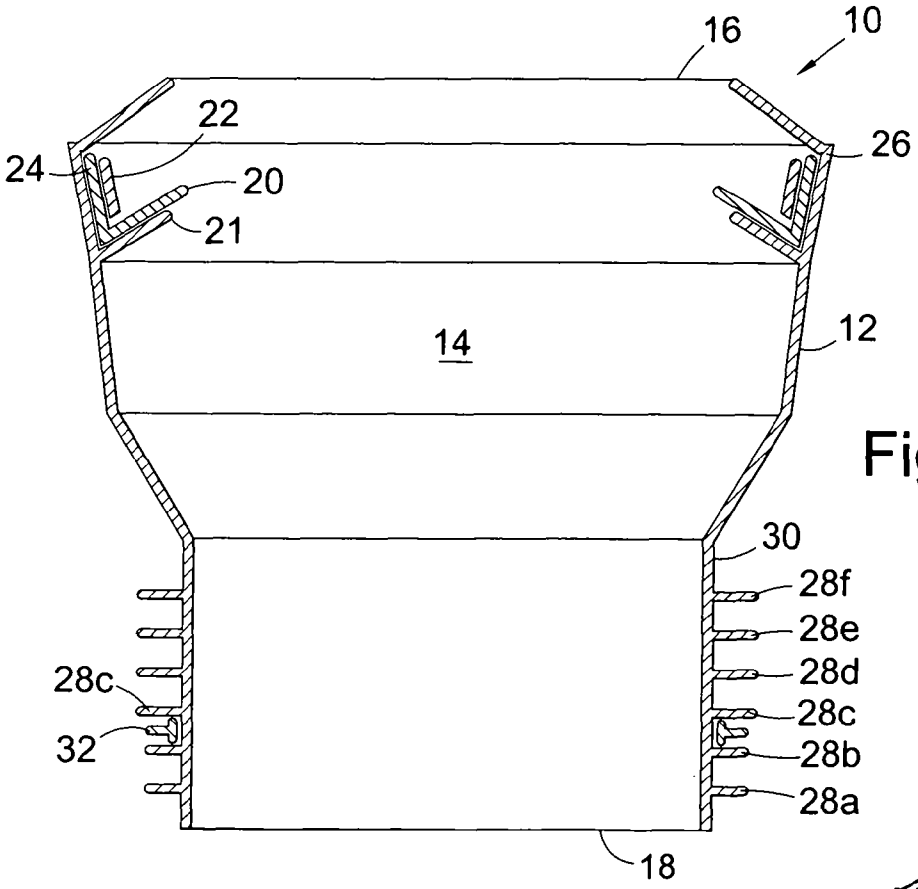

Fig. 2

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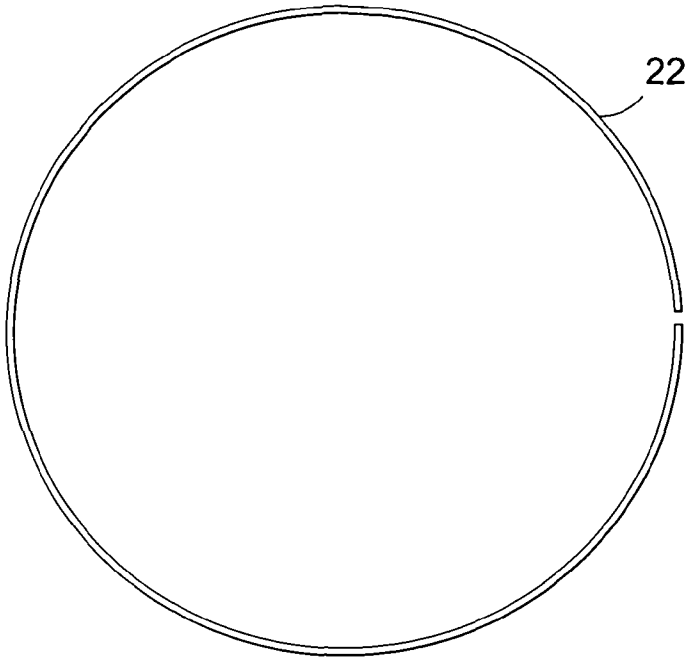

Fig. 3

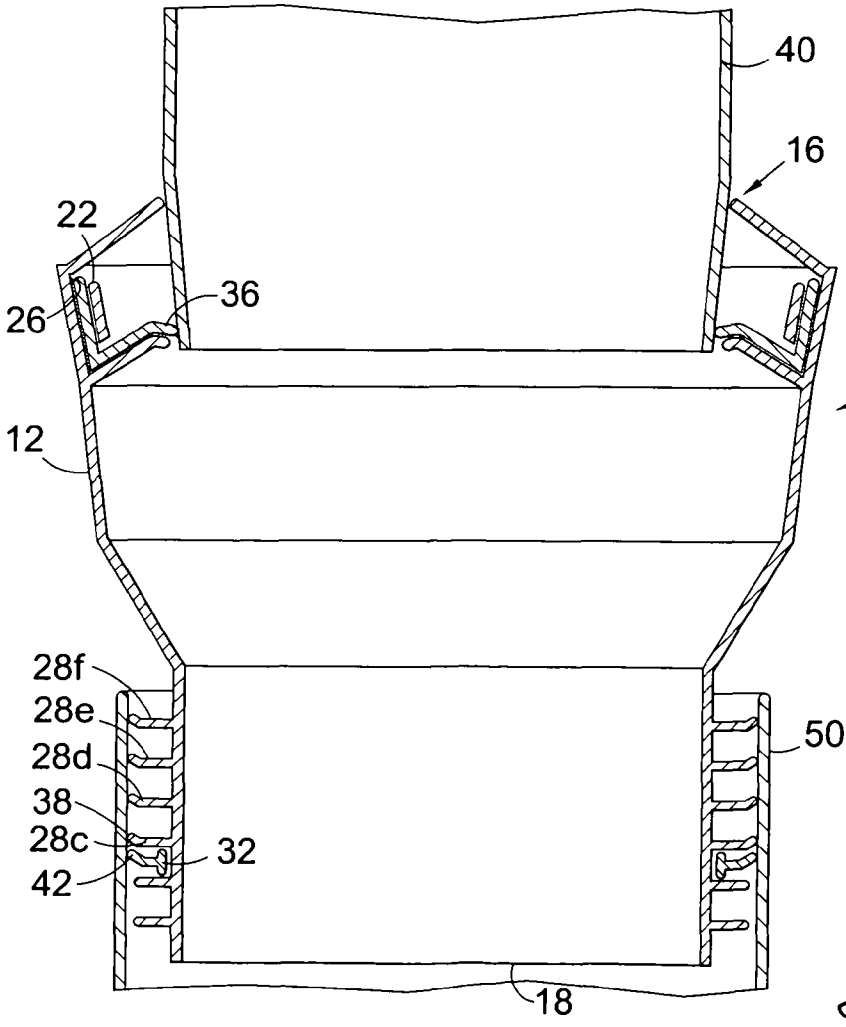

Fig. 4

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