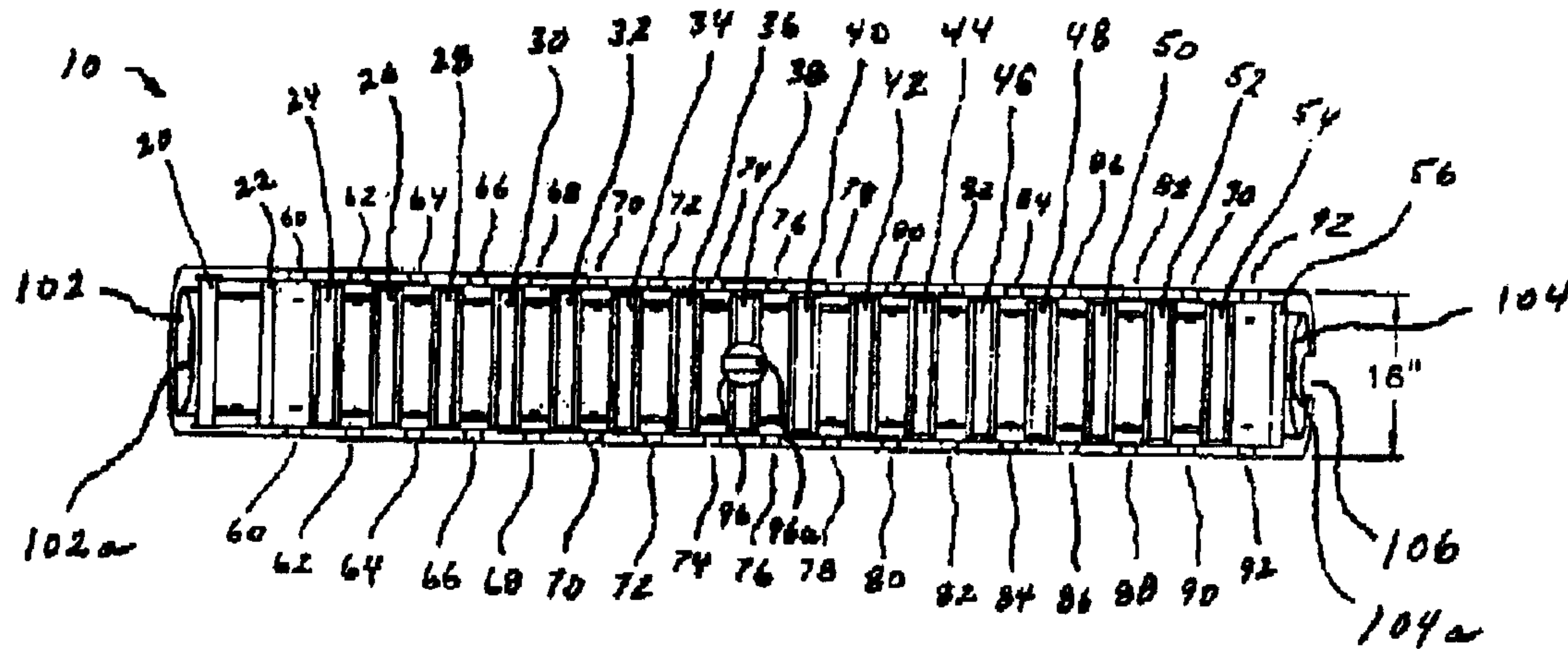




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(54) Titre : RESERVOIR A EAU DE PLUIE OU DE VIDANGE COMPORTANT DES CRANS D'ARRET DE TRACTION AMELIORANT LA FLEXIBILITE TOUT AUTOUR DU RESERVOIR
(54) Title: STORM OR WASTE WATER CHAMBER FEATURING STRAIN RELIEF NOTCHES FOR IMPROVED FLEXIBILITY AND CONTOURING THE CHAMBER



(57) Abrégé/Abstract:

A chamber is provided that is flexible and able to be contoured along the entire length of the chamber when deployed on rock and earth formations with variable gradings. The chamber has a multiplicity of stress relief notches (also known as flex ports) formed on both sides at the base of the chamber substantially along the entire length of the chamber. A separate stress relief notch is formed between respective pair of protruding ribs along substantially the entire length of the chamber so the chamber can flex in an accordion-like or caterpillar-like manner. The chamber may be molded to include the strain relief notches.

PATENT
2-435-29-2**ABSTRACT OF THE DISCLOSURE**

5 A chamber is provided that is flexible and able to be contoured along the entire length of the chamber when deployed on rock and earth formations with variable gradings. The chamber has a multiplicity of stress relief notches (also known as flex ports) formed on both sides at the base of the chamber substantially along the entire length of the chamber. A separate stress relief notch is formed between respective pair of protruding

10 ribs along substantially the entire length of the chamber so the chamber can flex in an accordion-like or caterpillar-like manner. The chamber may be molded to include the strain relief notches.

**STORM OR WASTE WATER CHAMBER
FEATURING STRAIN RELIEF NOTCHES
FOR FLEXING AND CONTOURING THE CHAMBER**

5

RELATED PATENT APPLICATIONS

This patent application is a continuation of and claims benefit to provisional patent application serial no. 60/184,272 (NFVA File No. 2-435-29), filed February 23, 2000, entitled "Storm or Waste Water Chamber Featuring Strain Relief Notches for Improved Flexibility and Contourability," which is hereby incorporated by reference in its entirety.

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BACKGROUND OF THE INVENTION

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1. Field of the Invention

The present invention is a chamber for managing storm or waste water.

2. Description of Related Art

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The inventor of the subject matter of the present patent application has a number of issued United States patents and pending United States patent applications on galleries and chambers for managing storm or waste water that are known in the art. The reader is referred to United States Patent No. 5,087,151, entitled "Drainage System," United States Patent No. 5,419,838, entitled "Groundwater Storage and Distribution System having a

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5 Gallery and Filtering Means;" United States provisional
 patent application serial no. 60/053,896, filed October
 31, 1997, as well as United States patent application
 serial no. 09/183,111, both entitled "Reversible
 Interlocking Field Drain Panel," filed October 30, 1998,
 all owned by the instant inventor and incorporated by
 reference in their entirety, for a detailed description
 of how the galleries or chambers are made and used in the
 water management industry. The inventor's galleries or
 10 chambers have been applied to other areas of technology,
 see United States Patent No. 5,773,756, entitled
 "Lightweight and Durable Utility Pull Box for Protecting
 Slices and Junctions of Underground Coaxial Cables,
 Electrical Wires and Optical Fiber", also incorporated by
 15 reference in its entirety.

In particular, the aforementioned United States
 patent application serial no. 09/183,111 shows a
 reversible interlocking field drain panel having twenty
 five transverse strengthening ribs and three lateral
 20 transfer tunnels or side transfer openings (see reference
 label T3). One of the lateral transfer tunnels or side
 transfer openings is located substantially in the middle
 of the chamber, while the other two are located at about
 one quarter and three quarters along the length of the
 chamber. The lateral transfer tunnels or side transfer
 25 openings have a halfmoon-dimension for fitting one half

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5 of a four inch pipe (i.e., having a four inch diameter)
and function to transfer water or liquid from tunnel to
tunnel. The lateral transfer tunnels or side transfer
openings do not provide meaningful lateral or transverse
flexing along the length of the chamber.

SUMMARY OF THE INVENTION

10 The present invention provides a new and unique
chamber that is flexible and able to be contoured along
the entire length of the chamber when deployed on rock
and earth formations with variable gradings.

15 The chamber (a.k.a. the EZ-24 chamber) has a
multiplicity of stress relief notches (also known as flex
ports) formed on both sides at the base of the chamber
substantially along the entire length of the chamber. In
one embodiment, a separate stress relief notch is formed
between respective pair of protruding ribs along
20 substantially the entire length of the chamber so the
chamber can flex in an accordion-like or caterpillar-like
manner. The chamber may be flexed or contoured
horizontally (i.e. laterally), vertically (i.e.
transversely) or a combination thereof with respect to
the ground plane along the length of the chamber. The
chamber may be molded to include the strain relief
25 notches.

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BRIEF DESCRIPTION OF DRAWING

Figure 1A is a side view of a chamber that is the subject matter of the present invention.

5 Figure 1B is an end view of the chamber in Figure 1A along lines 1B-1B.

Figure 1C is an end view of the chamber in Figure 1A along lines 1C-1C.

Figure 1D is a top view of the chamber in Figure 1A.

10 Figure 2 is a photo of the chamber shown in Figure 1A with a curved deflection along a ground plane.

Figure 3 is a chart showing models and available deflection per 100 feet.

Figure 4 is a photo of the chamber shown in Figure 1A with a circular deflection along a ground plane.

15 Figure 5 is a diagram of a chamber with a deflection transverse to a ground plane.

Figure 6 shows a section through a field drain bed having a field drain panel that is the subject matter of the present invention.

20 Figure 7 shows a top view of an embodiment of the chamber having a pipe carrier on the top thereof and a location where a raised part of a trough so a pipe won't pull out.

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DESCRIPTION OF THE BEST MODE OF THE INVENTION

Figures 1A, 1B, 1C, 1D

Figures 1A, 1B, 1C, 1D show a new and unique chamber generally indicated as 10 including an arched-housing 12 with a base generally indicated as 14, a multiplicity of protruding transverse circumferential strengthening ribs 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56 and a corresponding multiplicity of stress relief notches 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92 (also known as flex ports).

The multiplicity of protruding transverse circumferential strengthening ribs 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56 extend substantially along the entire length of the arched-housing 12.

The corresponding multiplicity of stress relief notches 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92 are disposed on the base 14 substantially along the entire length of the arched-housing 12. Figure 1D shows that the stress relief notches 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92 are formed on both sides along the base 14 of the chamber 10. Each stress relief notch 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92 is arranged between a respective pair of the

5 protruding transverse circumferential strengthening ribs
22, 24; 24, 26; 26, 28; 28, 30; 30, 32; 32, 34; 34, 36;
36, 38; 38, 40; 40, 42; 42, 44; 44, 46; 46, 48; 48, 50;
50, 52; 52, 54; 54, 56 so the chamber can flex along its
length and width in an accordion-like or caterpillar-like
manner for contouring the chamber when deployed on rock
and earth formations with variable gradings.

10 Each stress relief notch 60, 62, 64, 66, 68, 70, 72,
74, 76, 78, 80, 82, 84, 86, 88, 90, 92 is arched-shaped
and is about 0.75 inches high and 1.25 inches wide at the
base. The length of the chamber 10 is about 96 to 102
inches. The height of the chamber 10 is about 12 inches
from the top of a respective protruding transverse
15 circumferential strengthening rib 20, 22, 24, 26, 28, 30,
32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56 to the
base 14. As shown, the respective pair of the protruding
transverse circumferential strengthening ribs 22, 24; 24,
26; 26, 28; 28, 30; 30, 32; 32, 34; 34, 36; 36, 38; 38,
40; 40, 42; 42, 44; 44, 46; 46, 48; 48, 50; 50, 52; 52,
20 54; 54, 56 are spaced at a distance of about 5 1/3
inches. Similarly, adjacent pairs of stress relief
notches 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82,
84, 86, 88, 90, 92 are spaced at a distance of about 5
1/3 inches. Two protruding transverse circumferential
25 strengthening ribs 22, 56 are "smaller" ribs for
interlocking similar to that shown and described in

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United States patent application serial no. 09/183,111.
The chamber 10 has a width of about 16 inches. The scope
of the invention is also intended to cover embodiments
having other dimensions, including embodiments having
substantially the same proportionalities.

The chamber 10 may be molded from of a high
molecular weight/high density polyethylene. The scope of
the invention is also intended to cover embodiments
having other types of materials, including other types of
polymeric materials.

In Figures 1A, 1D, the chamber 10 has a raised
center inspection port 96. The raised center inspection
port has a recessed trough 96a to enable support and
locating assistance for PVC pressure distribution or
gravity feed pipe (not shown).

In Figures 1B and 1C, the chamber 10 has ends 102,
104 with openings 102a, 104a for receiving transport
piping (not shown) having water or other effluent. In
Figure 1C, the chamber end 104 has a lower opening 106
for receiving transport piping (not shown), water or
other effluent.

The chamber 10 has a straight line deflection in a
range of 5-25 feet per 100 feet.

In Figures 1A and 1D, the stress relief notches 60,
62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88,
90, 92 are shown as having an arched shape. However, the

scope of the invention is not intended to be limited to any particular shape of the stress relief notches or arches. Embodiments are envisioned in which the stress relief notches are shaped triangularly, squarely, or like a hexagon or diamond. Embodiments are envisioned in which the dimensions of the notch or arch have many different dimensions, so the scope of the invention is not intended to be limited to any particular set of dimensions.

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Figure 6: The Field Drain Panel

Figure 6 shows a section through a field drain bed generally indicated as 200 having one or more field drain panels 201, which is described in more detail in United States patent application serial no. 09/183,111. The field drain panel 201 has ends 202, 204 with openings 202a, 204a for receiving transport piping (not shown) having water or other effluent. The chamber end 202, 204 has a lower opening 202b, 204b for receiving transport piping (not shown), water or other effluent. The field drain panel 201 may include stress relief notches for providing flexing and conformability.

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As shown, the field drain panel 200 rests in a 4"-6" stone base 210 of 1.25-1.5" broken stone, has a 14" compacted fill (80%) covering 210, and is finished with a 2.5-3" asphalt grading 214. The calculations are based

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on a 40% void. An optional filter fabric 216 may be placed over and cover the field drain panel 200. A typical application may be deploying one or more of the field drain panels 200 under a parking lot.

5 In the field drain bed 200, the one or more field drain panels 201 may be replaced by one or more chambers like the chamber 10 shown in Figures 1A, 1B, 1C, 1D.

Figure 7: Humped Raised Portion Between Ribs

10 Figure 7 shows an embodiment in which the chamber has the pipe carrier or cradle generally indicated as 98 that is formed on the top of the chamber rib, allowing the pipe to "slide" on top of the chamber. In effect, a "hump" (raised portion) could also be formed between
15 ribs, allowing the pipe to "slide" on top of the chamber.

Raised Part of Trough

Figure 7 also show a location for the raised part 96 of a trough on the chamber so the pipe won't pull off. This is attained by use of raised lettering in
20 combination with a little knob.

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The Scope of the Invention

It is also to be understood that the intended claims will be drafted in a regular United States patent application to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

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IN THE CLAIMS

1. A chamber comprising:

an arched-housing having a base and having a multiplicity of protruding transverse circumferential strengthening ribs extending substantially along the entire length of the arched-housing; and

a corresponding multiplicity of stress relief notches disposed on the base substantially along the entire length of the arched-housing, each stress relief notch being arranged between a respective pair of the protruding transverse circumferential strengthening ribs so the chamber can flex along its length and width in an accordion-like or caterpillar-like manner for contouring the chamber when deployed on rock and earth formations with variable gradings.

2. A chamber according to claim 1, wherein each stress relief notch has an arch shape and is about 0.75 inches high and 1.25 inches wide at the base.

3. A chamber according to claim 1, wherein the length of the chamber is about 96 to 102 inches.

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4. A chamber according to claim 1, wherein the height of the chamber is about 12 inches from the top of a respective protruding transverse circumferential strengthening rib to the base.

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5. A chamber according to claim 1, wherein the respective pair of the protruding transverse circumferential strengthening ribs and stress relief notches are spaced at a distance of about 5 1/3 inches.

10

6. A chamber according to claim 1, wherein the chamber has a width of about 16 inches.

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7. A chamber according to claim 1, wherein the chamber has a straight line deflection in a range of 5-25 feet per 100 feet.

20

8. A chamber according to claim 1, wherein the chamber is formed of a high molecular weight/high density polyethylene.

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9. A chamber according to claim 1, wherein the chamber has a raised center inspection port.

10. A chamber according to claim 1, wherein the raised center inspection port has a recessed trough to enable support and locating assistance for PVC pressure distribution or gravity feed pipe.

5

11. A field drain panel having a plurality of chambers, each comprising:

an arched-housing having a base and having a multiplicity of protruding transverse circumferential strengthening ribs extending substantially along the entire length of the arched-housing; and

10

a corresponding multiplicity of stress relief notches disposed on the base substantially along the entire length of the arched-housing, each stress relief notch being arranged between a respective pair of the protruding transverse circumferential strengthening ribs so the chamber can flex along its length and width in an accordion-like or caterpillar-like manner for contouring the chamber when deployed on rock and earth formations with variable gradings.

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12. A field drain panel according to claim 11, wherein the field drain panel has a straight line deflection in a range of 1-10 feet per 100 feet.

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13. A field drain panel according to claim 11,
wherein each stress relief notch has an arch shape and is
about 0.75 inches high and 1.25 inches wide at the base.

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14. A field drain panel according to claim 11,
wherein the respective pair of the protruding transverse
circumferential strengthening ribs and stress relief
notches are spaced at a distance of about $5 \frac{1}{3}$ inches.

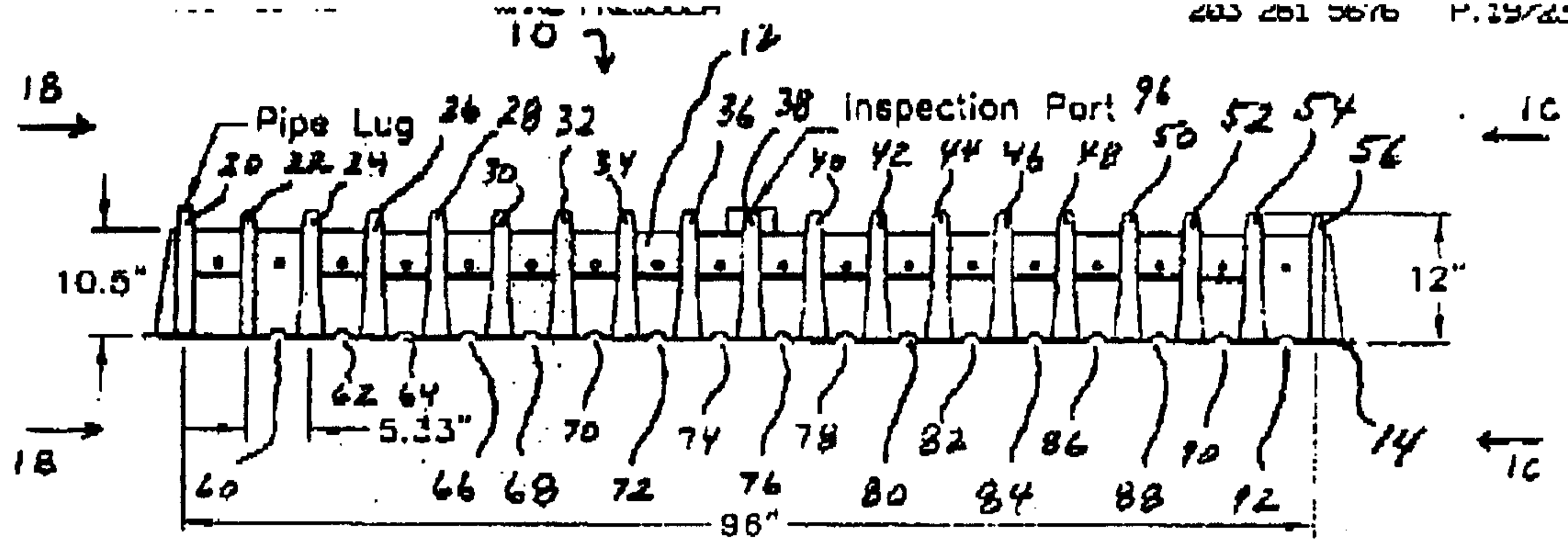


Figure 1A

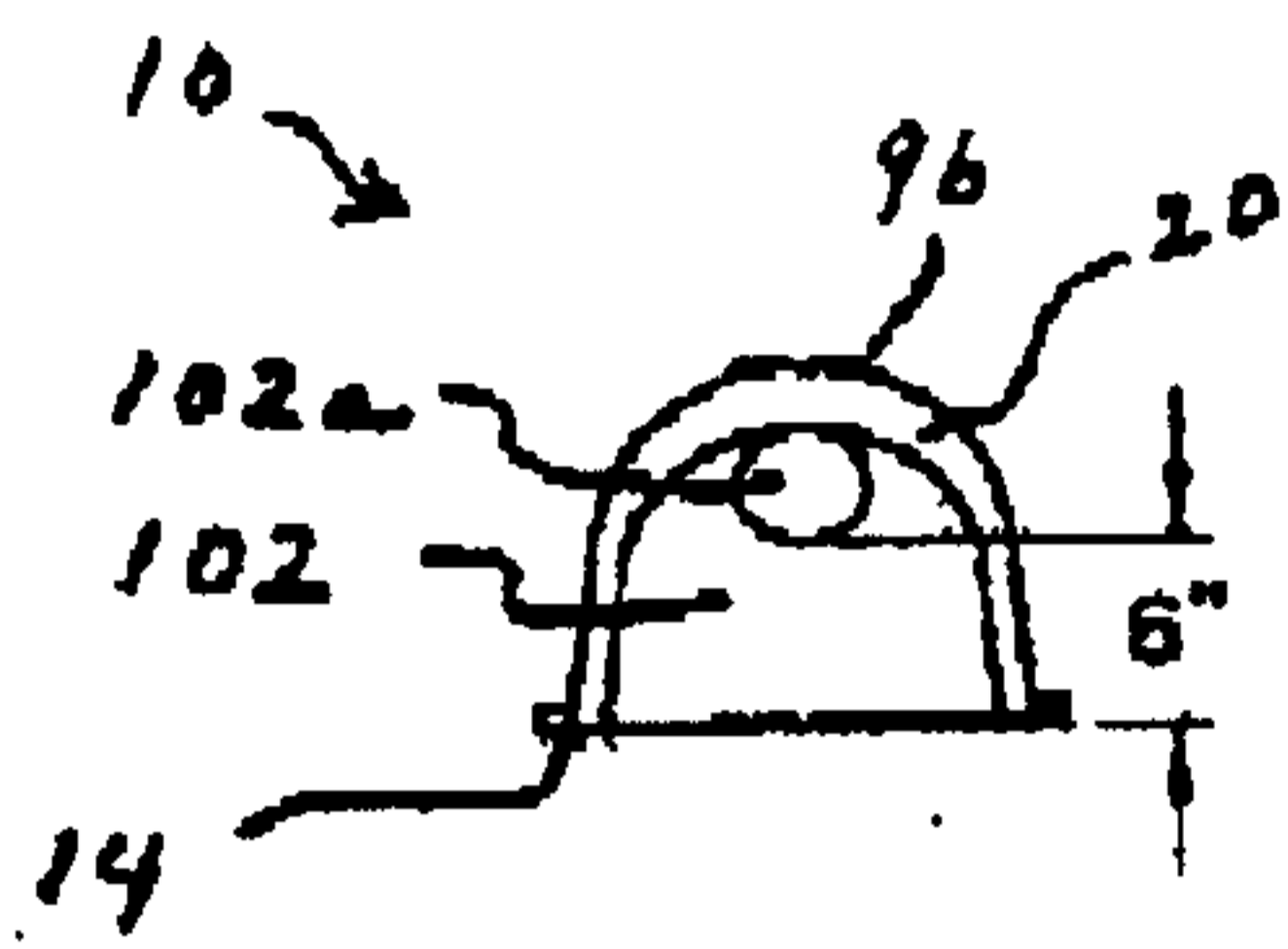


Figure 1B

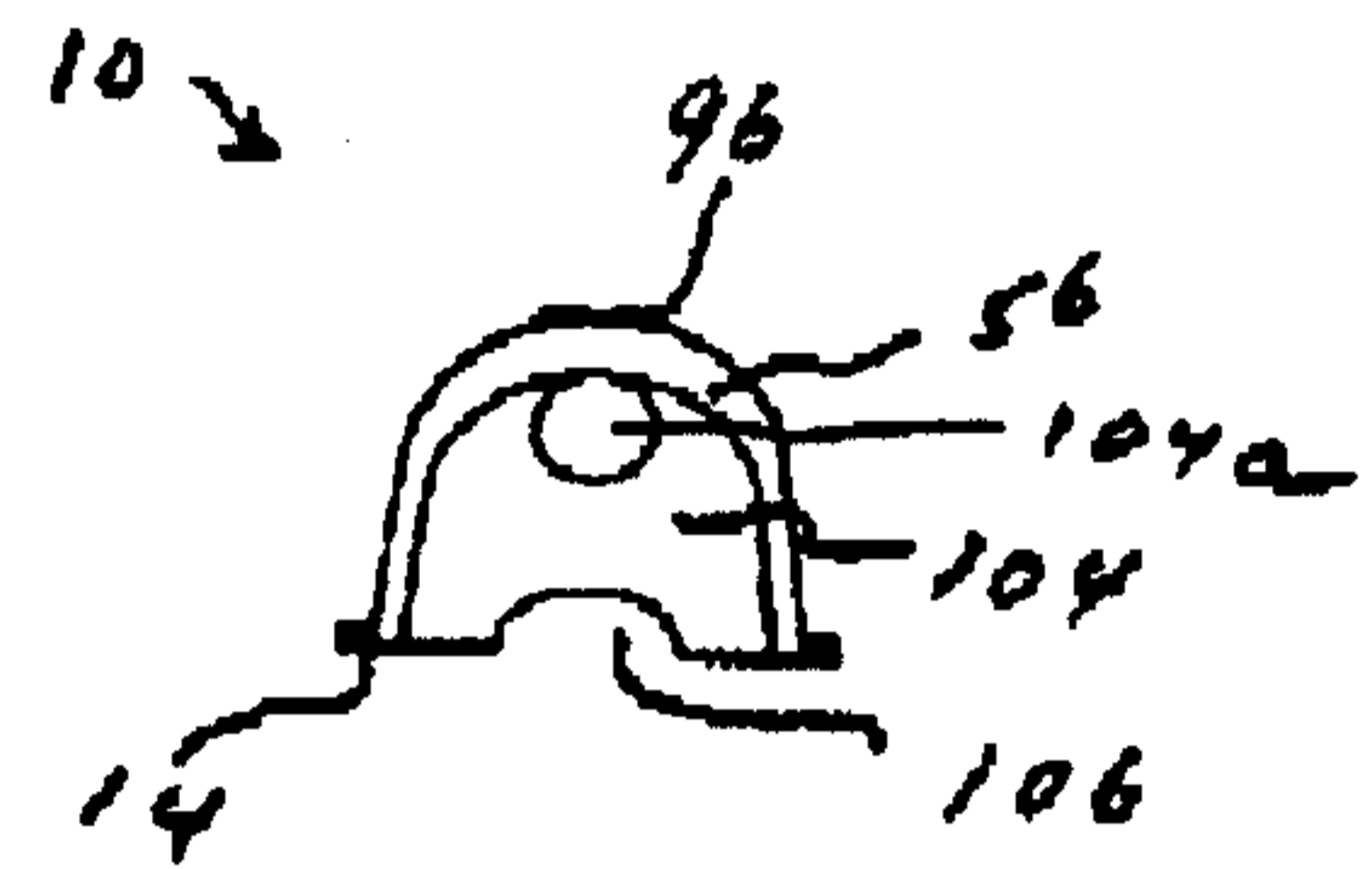


Figure 1C

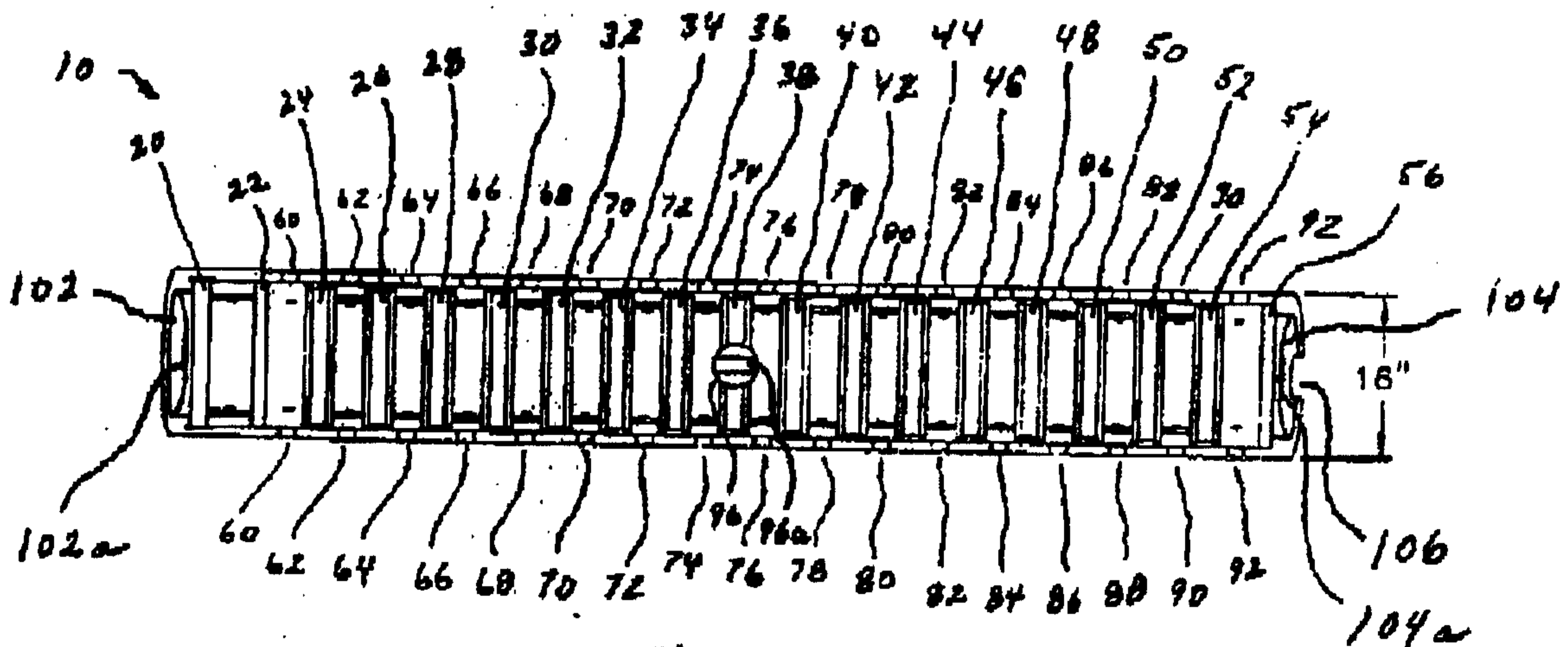


Figure 1D

Straight Line Deflection of Cultec's Chambers

The overlapping rib connection used by Cultec's CONTACTOR™, RECHARGER™ and FIELD DRAIN® PANEL chambers permits a curved line of installation. This is beneficial quality when following land contours or a sweep around an obstruction is necessary.



Figure shown:
Model
EZ-24

Figure 2

| Model | Available Deflection (per 100') |
|------------------------|------------------------------------|
| FIELD DRAIN™ PANEL C-1 | 10' |
| FIELD DRAIN™ PANEL C-2 | 9' |
| FIELD DRAIN™ PANEL C-3 | 7.5' |
| FIELD DRAIN™ PANEL C-4 | 1' |
| CONTACTOR™ Model EZ-24 | 23' |
| CONTACTOR™ Model 75 | 8' |
| CONTACTOR™ Model 100 | 5' |
| CONTACTOR™ Model 125 | 8' |
| RECHARGER™ Model 180 | 6' |
| RECHARGER™ Model 330 | 5' |
| RECHARGER™ Model 400 | 6.5' |

Figure 3

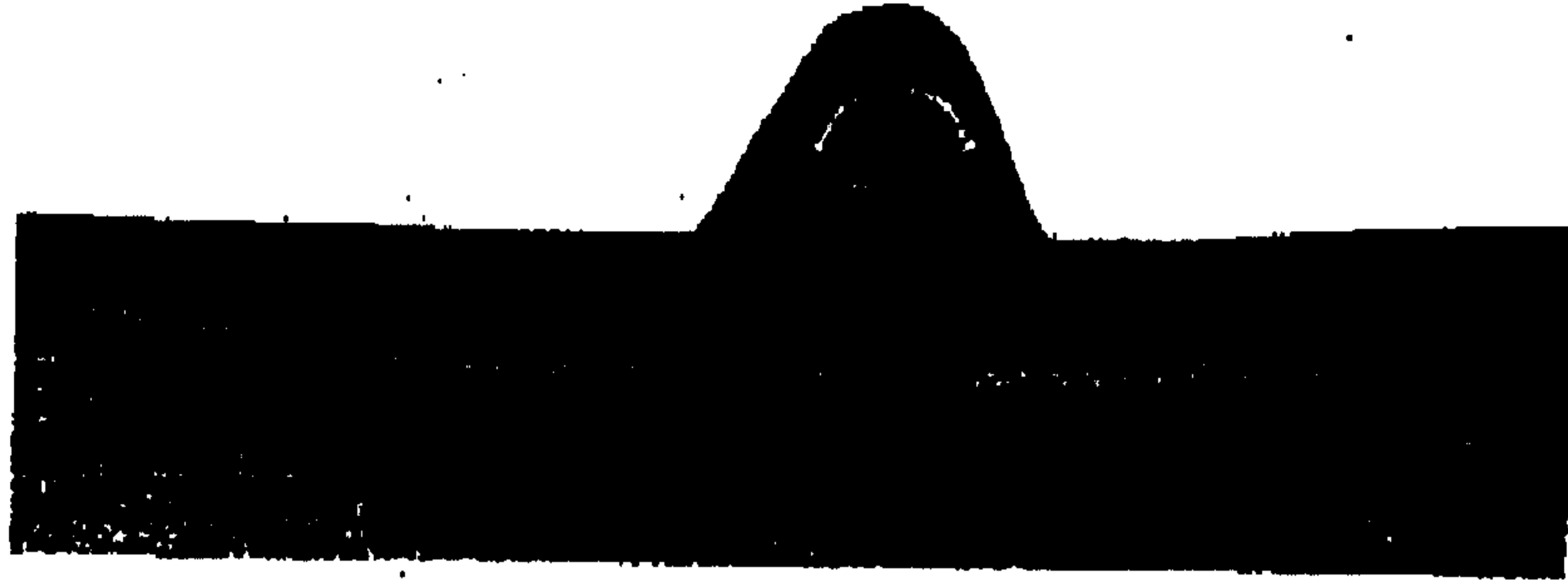


Figure 4

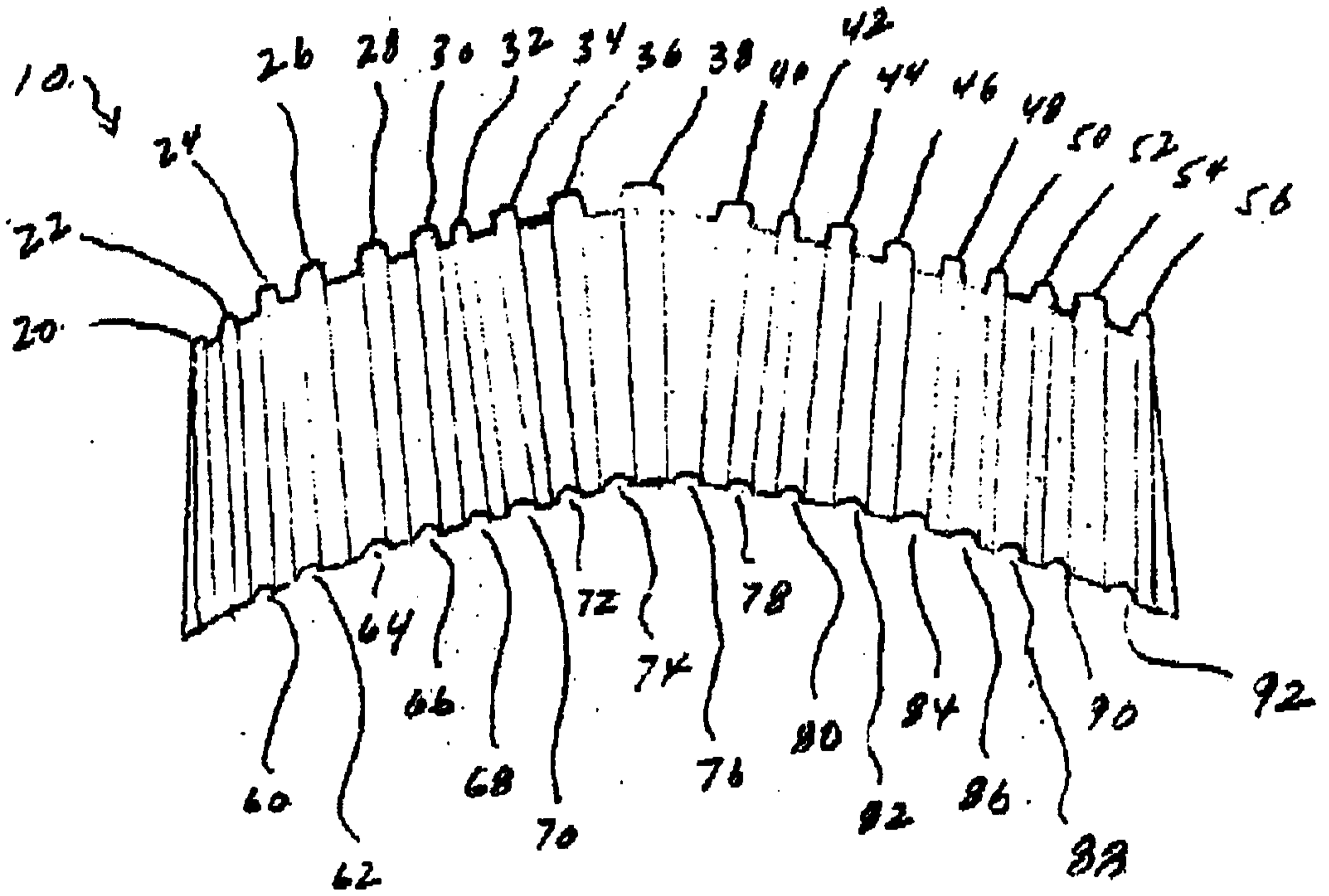


Figure 5

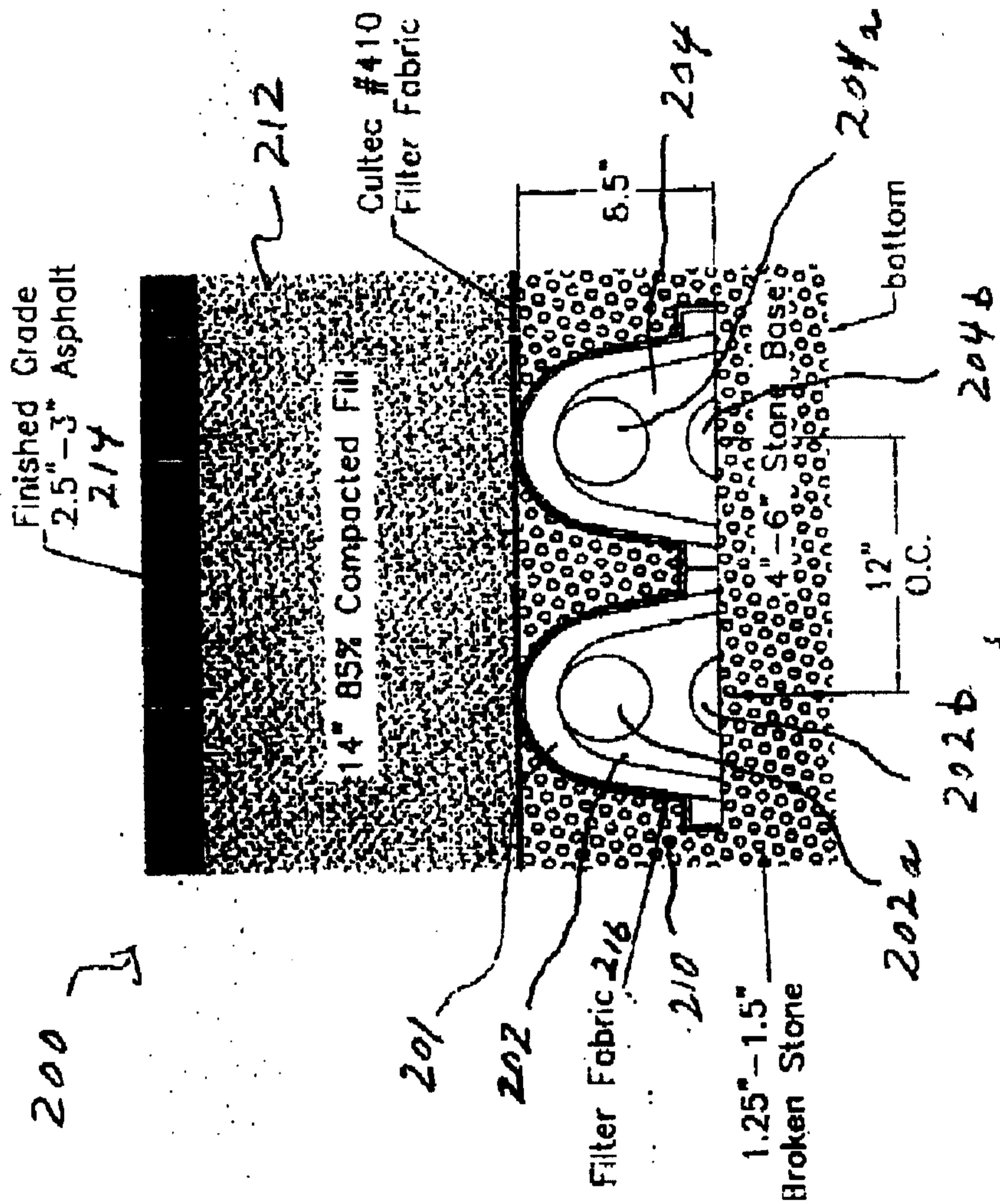


Figure 6

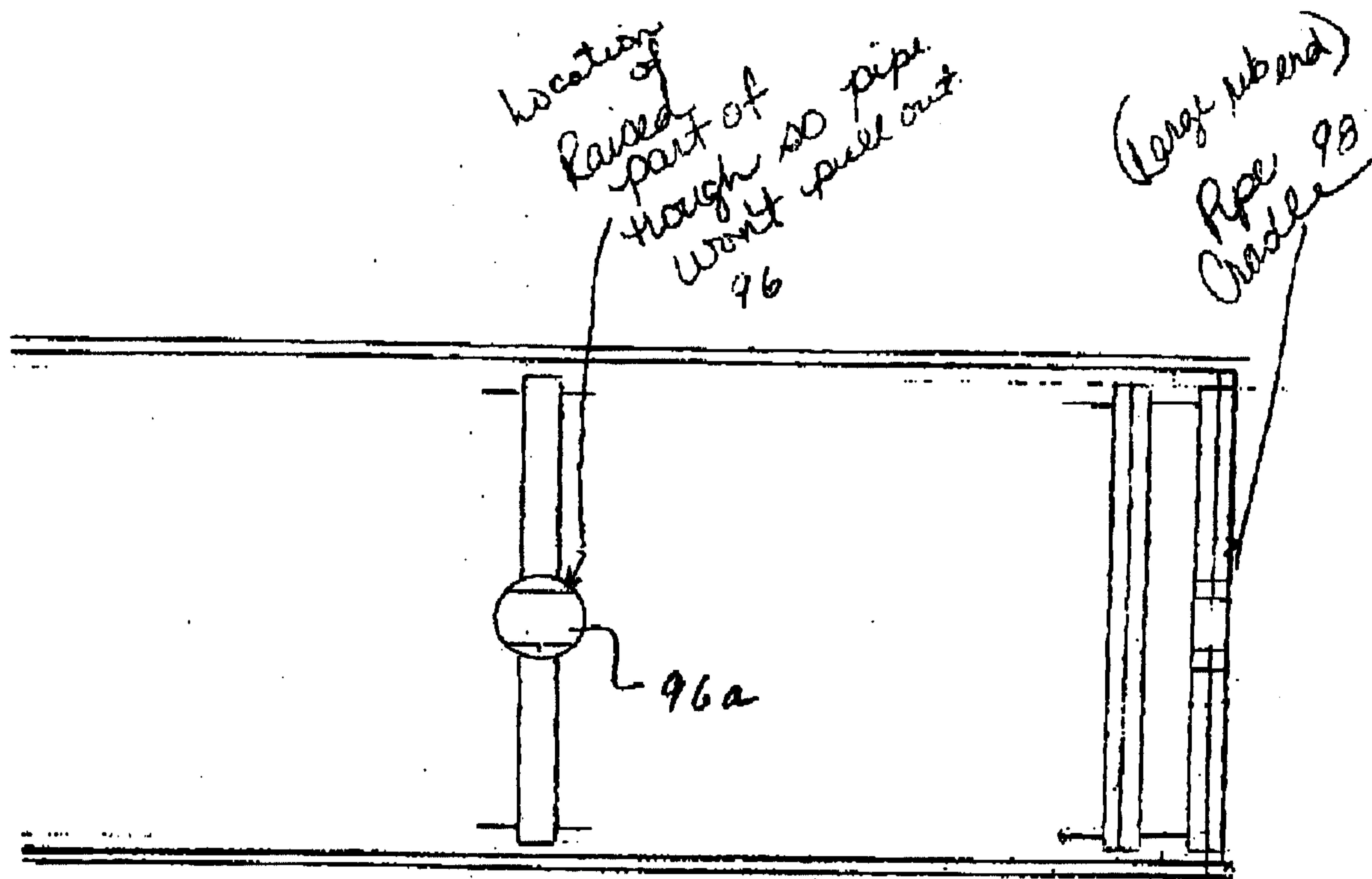


Figure 7

TOTAL P.23

