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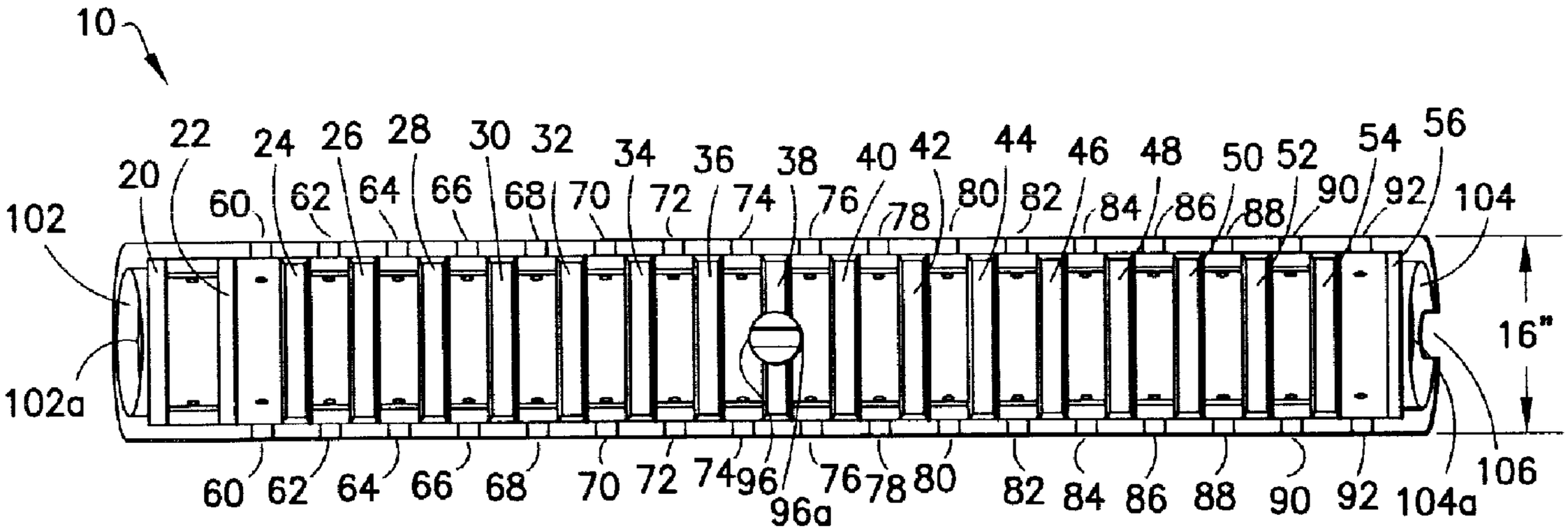
(72) Inventeur/Inventor:
DITULLIO, ROBERT J., US

(73) Propriétaire/Owner:
DITULLIO, ROBERT J., US

(74) Agent: BORDEN LADNER GERVAIS LLP

(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.

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.

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

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 Gallery and Filtering Means;" and United States Patent No. 6,129,482, entitled "Reversible Interlocking Field Drain Panel," all owned by the instant inventor, for a detailed description of how the galleries or chambers are made and used in the water management industry. The inventor's galleries or 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".

In particular, the aforementioned United States Patent No. 6,129,482 shows a reversible interlocking field drain panel having twenty five transverse strengthening ribs and three lateral 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 openings have a halfmoon-dimension for fitting one half 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.

In summary, 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.

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 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 notches.

The invention will now be described in greater detail, with reference to the accompanying drawings, in which:

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

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.

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.

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.

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.

Referring now to Figures 1A, 1B, 1C, 1D, there is shown 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 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.

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 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, 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 strengthening ribs 22, 56 are "smaller" ribs for interlocking similar to that shown and described in United States Patent No. 6,129,482. 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.

Figure 6 relates to the field drain panel, and 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 contourability.

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 (85%) covering 212, and is finished with a 2.5-3" asphalt grading 214. The calculations are based 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.

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 is of a humped raised portion between ribs, and 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 ribs, allowing the pipe to "slide" on top of the chamber.

Figure 7 shows 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 combination with a little knob.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

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.

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.

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.

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

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.

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

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

10. A chamber according to claim 9, wherein the raised center inspection port has a recessed trough to enable support and locating assistance for PVC pressure distribution or gravity feed pipe.

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

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.

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.

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.

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 1/3 inches.

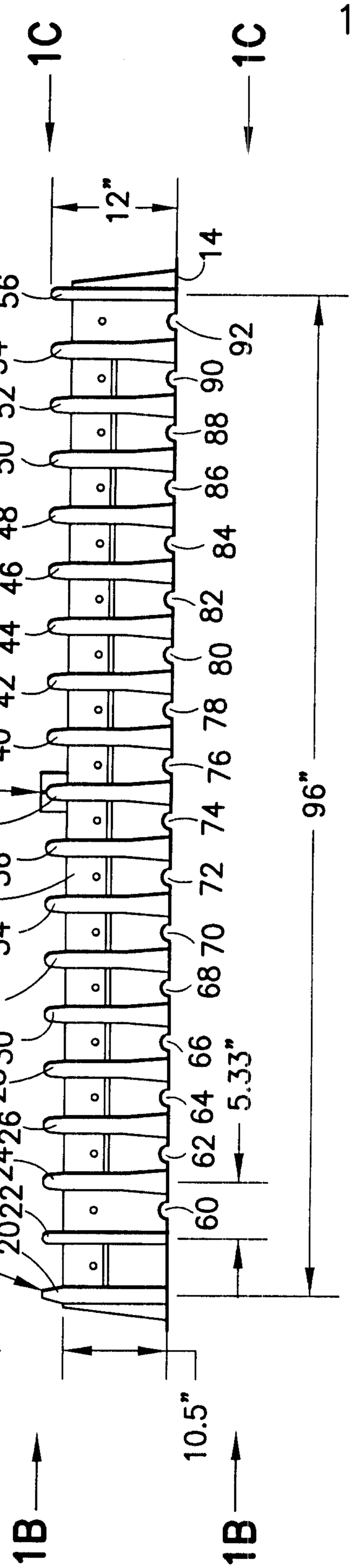


FIG.1A

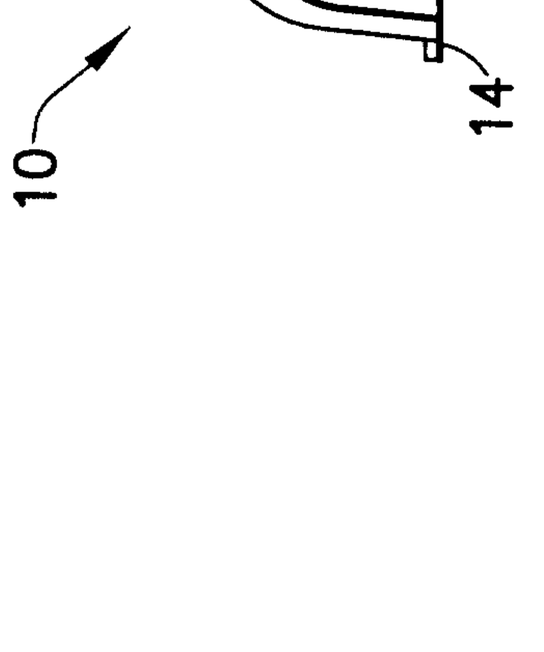


FIG.1C

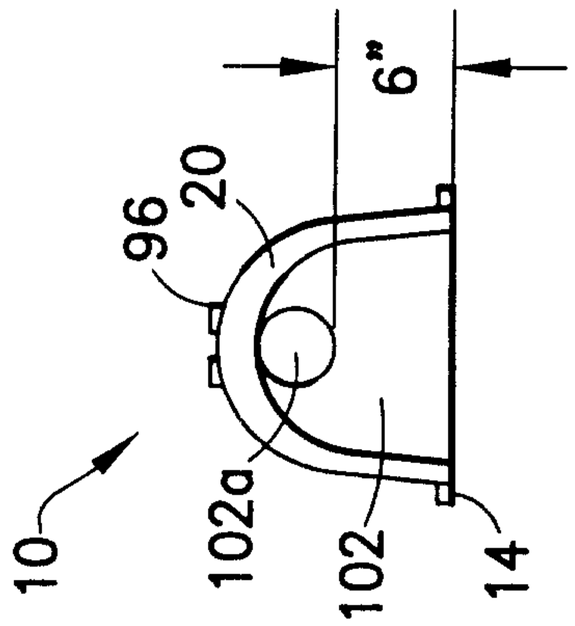
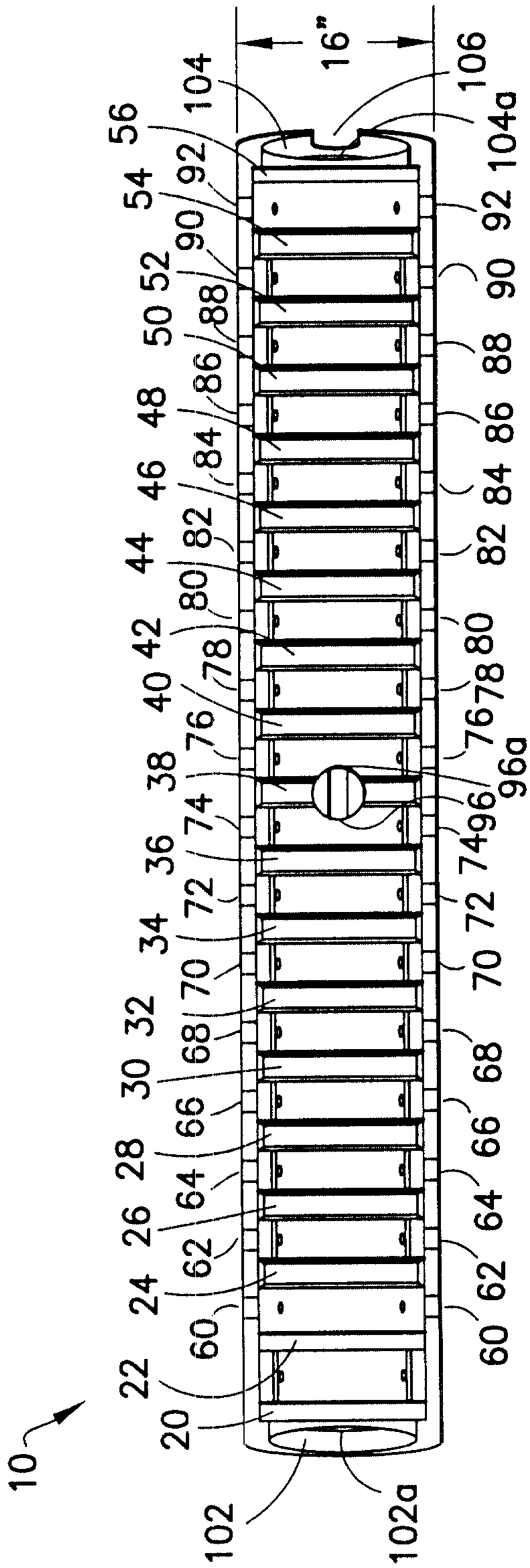


FIG.1B


16"
104
106
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104a
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44
82
82
42
80
80
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96a
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10
102
102a

FIG.1D

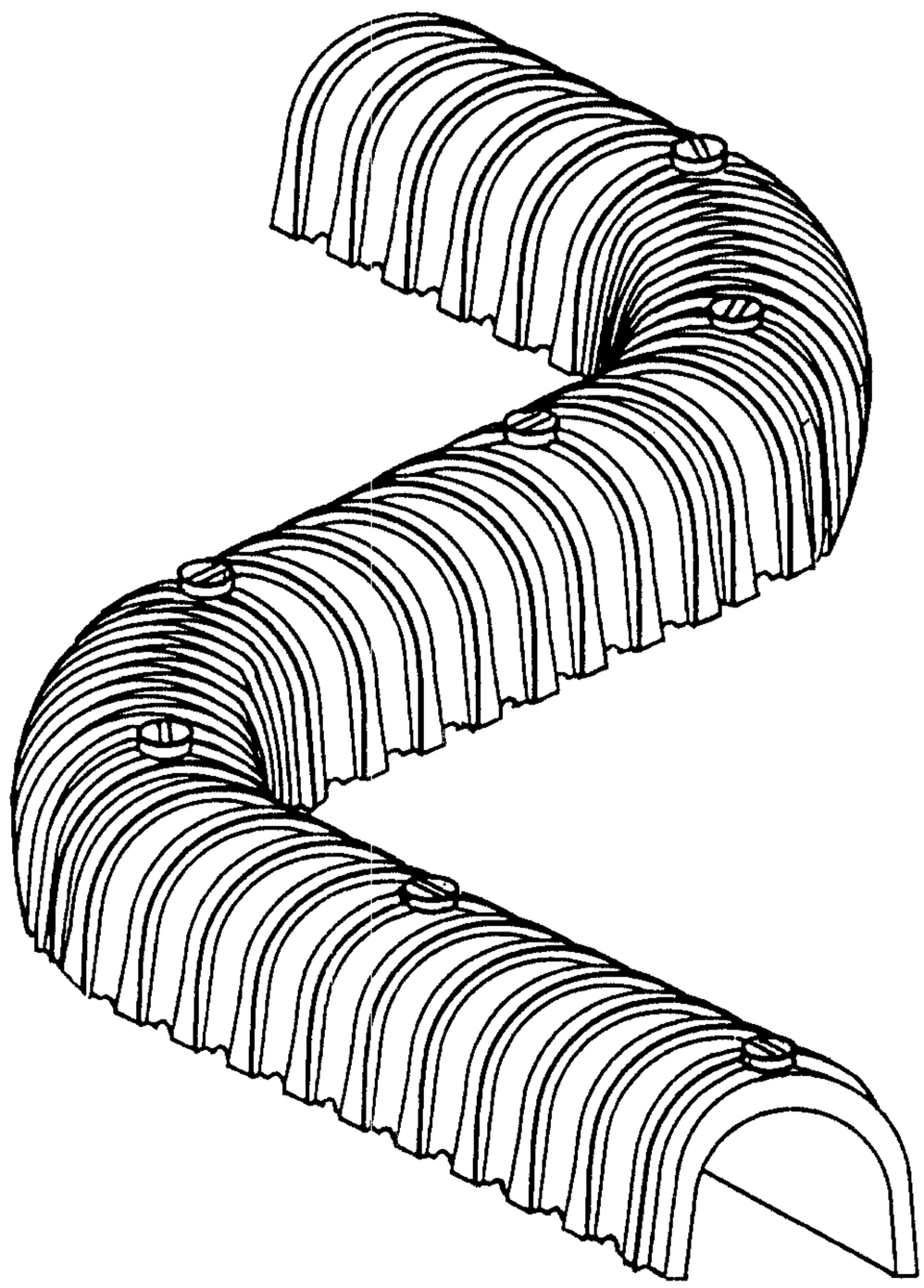


FIG.2

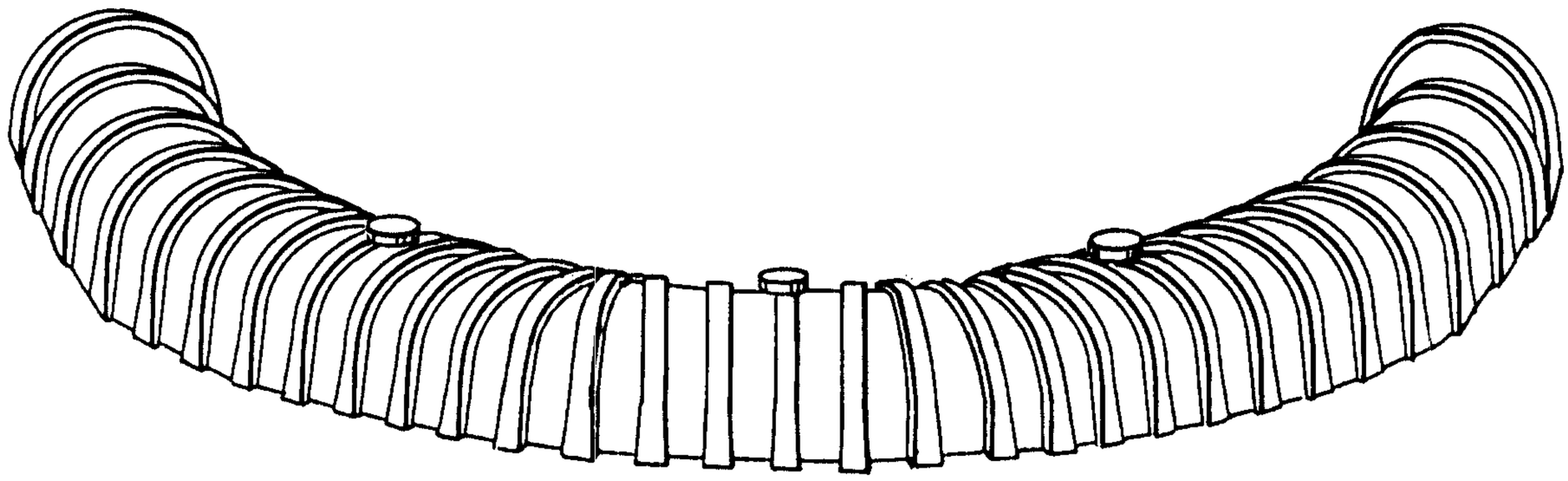


FIG.4

MODEL	AVAILABLE DEFECTION (PER 100')
FIELD DRAIN™ PANEL C--1	10'
FIELD DRAIN™ PANEL C--2	9'
FIELD DRAIN™ PANEL C--3	2.5'
FIELD DRAIN™ PANEL C--4	1'
CONTACTOR™ MODEL EZ-24	25'
CONTACTOR™ MODEL 75	8'
CONTACTOR™ MODEL 100	6'
CONTACTOR™ MODEL 125	8'
RECHARGER™ MODEL 180	6'
RECHARGER™ MODEL 330	5'
RECHARGER™ MODEL 400	6.5'

FIG.3

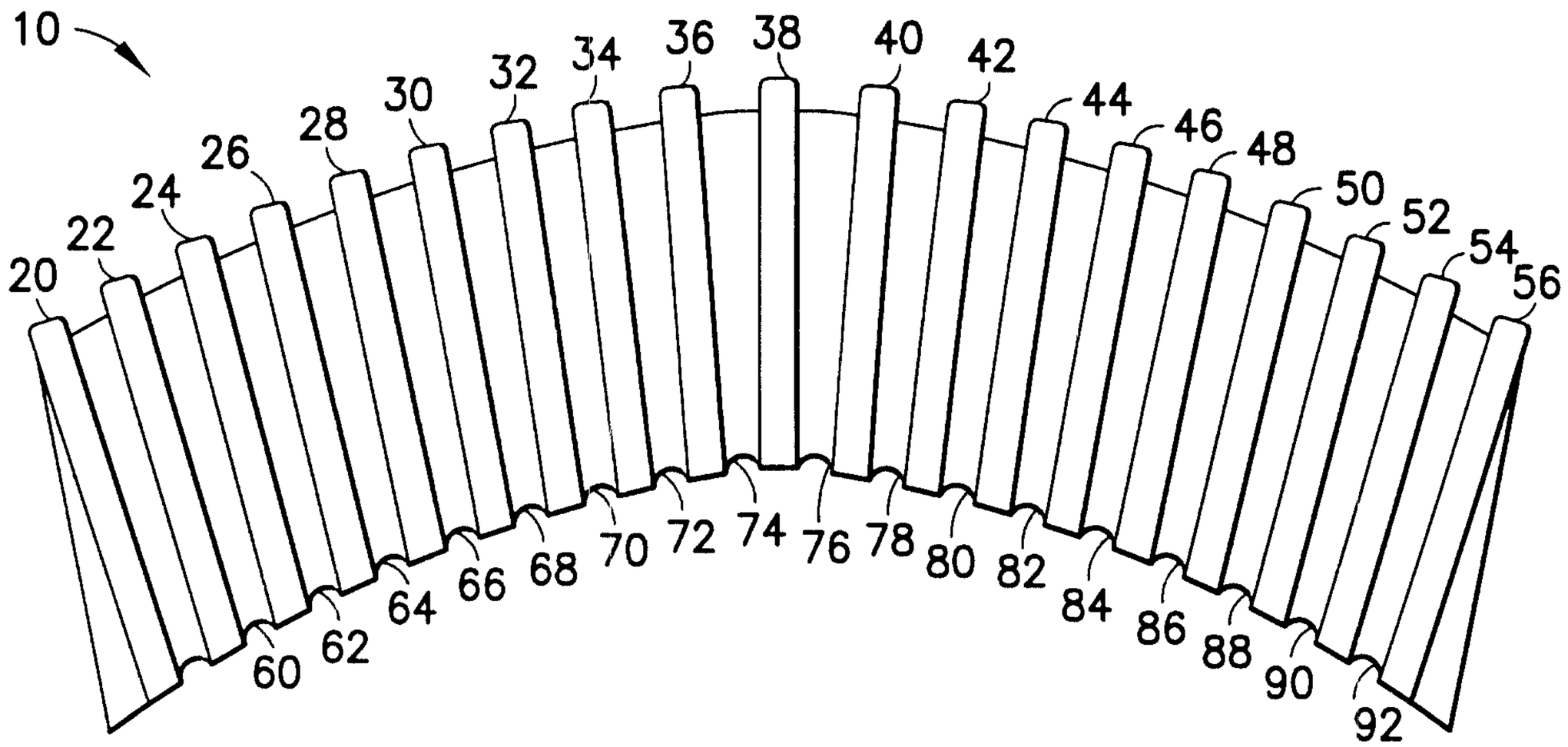


FIG.5

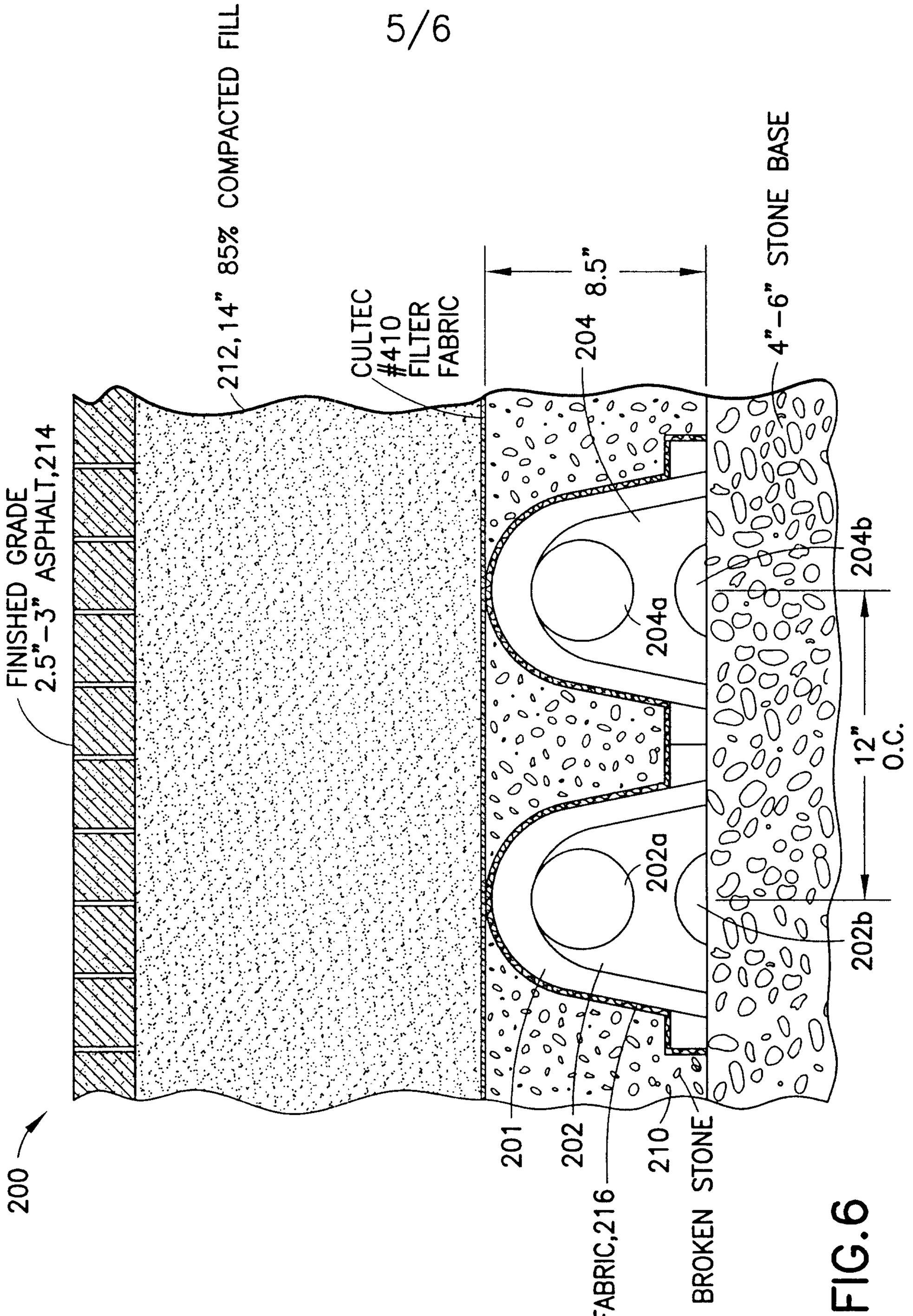

FINISHED GRADE
2.5"–3" ASPHALT,214
COMPACTED FILL
212,14" 85%
CULTEC
#410
FILTER
FABRIC
204 8.5"
4"–6" STONE BASE
204a
204b
12"
O.C.
202a
202b
200
201
202
210
FILTER FABRIC,216
1.25"–1.5" BROKEN STONE

FIG.6

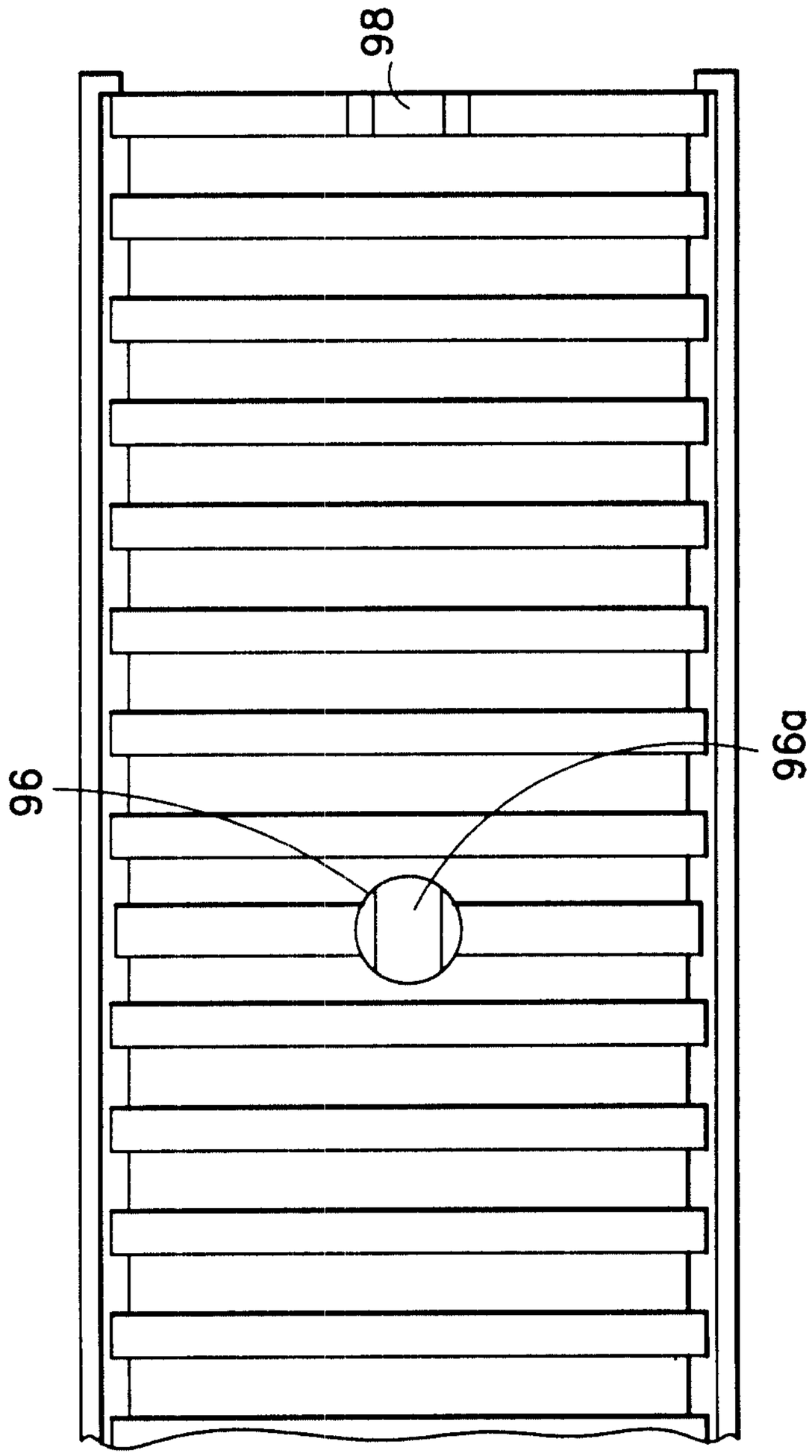
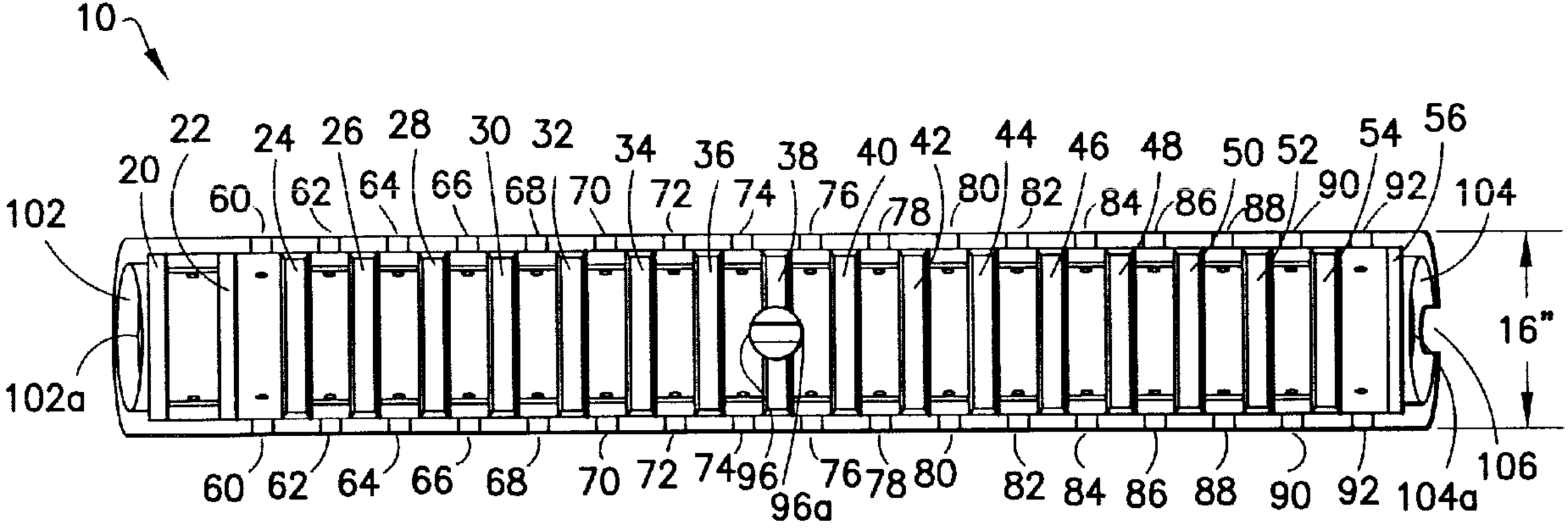


FIG.7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102a
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96a
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104a
106