

[54] **CORRUGATED DRAINAGE PIPE WITH PLATEAUS DEFINING RECESSES**

[75] Inventor: **Ernest J. Maroschak**, Roseboro, N.C.

[73] Assignee: **Plastic Tubing, Inc.**, Roseboro, N.C.

[22] Filed: **June 12, 1972**

[21] Appl. No.: **262,103**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 228,508, Feb. 23, 1972.

[52] U.S. Cl. **61/10, 61/12, 138/105, 138/121, 138/173**

[51] Int. Cl. **E02b 13/00, F16l 11/06**

[58] Field of Search **61/10, 11, 12, 13; 138/105, 121, 173, 178**

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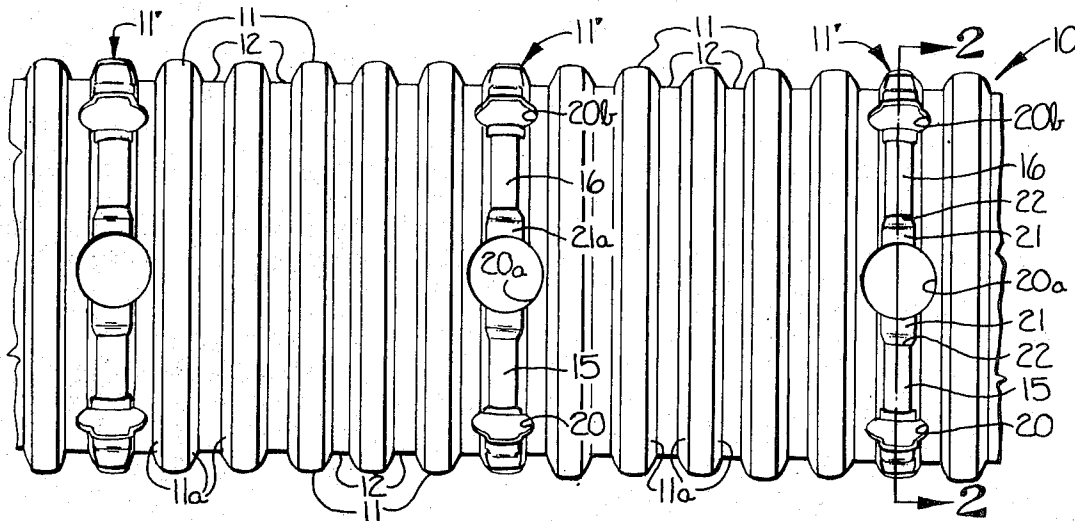
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Primary Examiner—Jacob Shapiro
Attorney—Donald M. Seltzer et al.

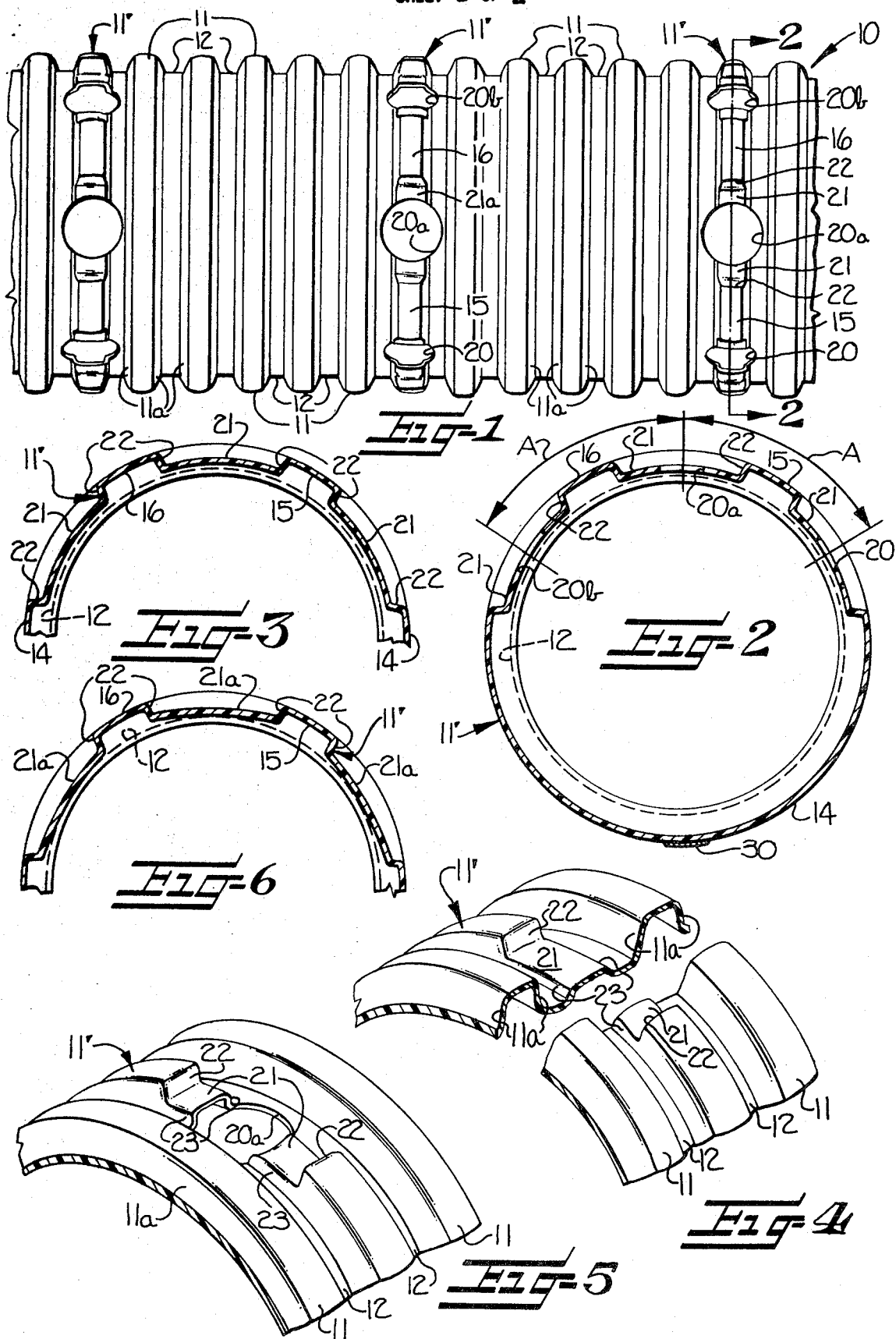
[57] **ABSTRACT**

A resilient plastic drainage pipe of lightweight construction having spaced apart successively arranged ribs with interconnecting valley portions therebetween defining corrugations along the periphery of the pipe, the majority of the ribs being uninterrupted and arranged in spaced groups with an interrupted rib between adjacent groups, each interrupted rib comprising a set of three circularly arranged spaced apart arcuate rib segments correspondingly arranged throughout the pipe, one rib segment of each set being substantially longer than the other two rib segments and having an arcuate extent of at least 180 degrees, recessed wall portions extending between and interconnecting adjacent arcuate rib segments and positioned at a level intermediate that of the peripheries of the ribs and valley portions, and a drainage hole provided in each recessed wall portion.

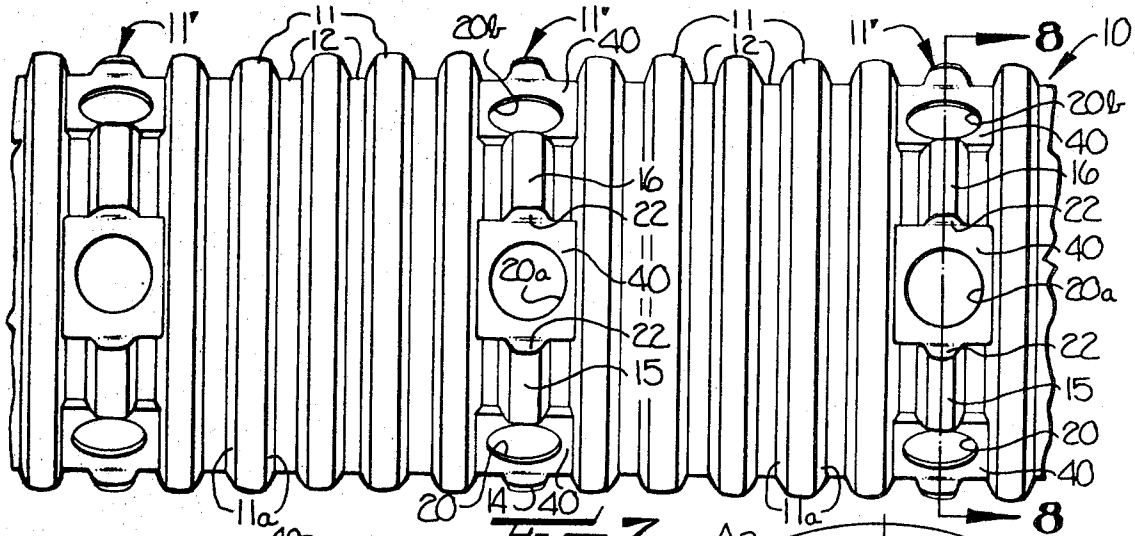
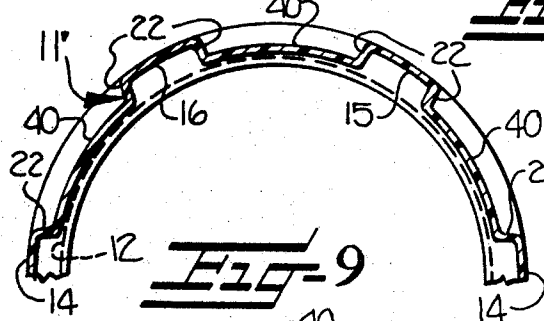
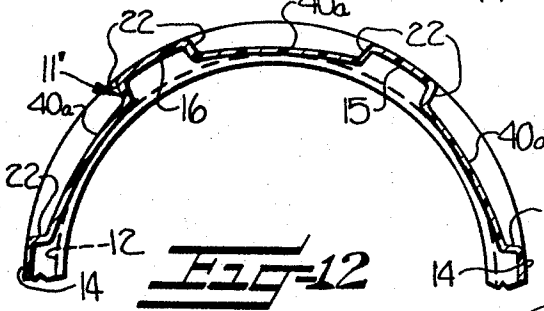
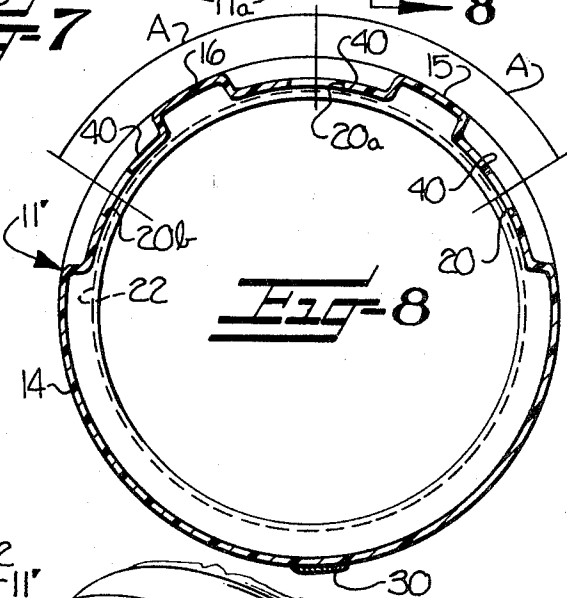
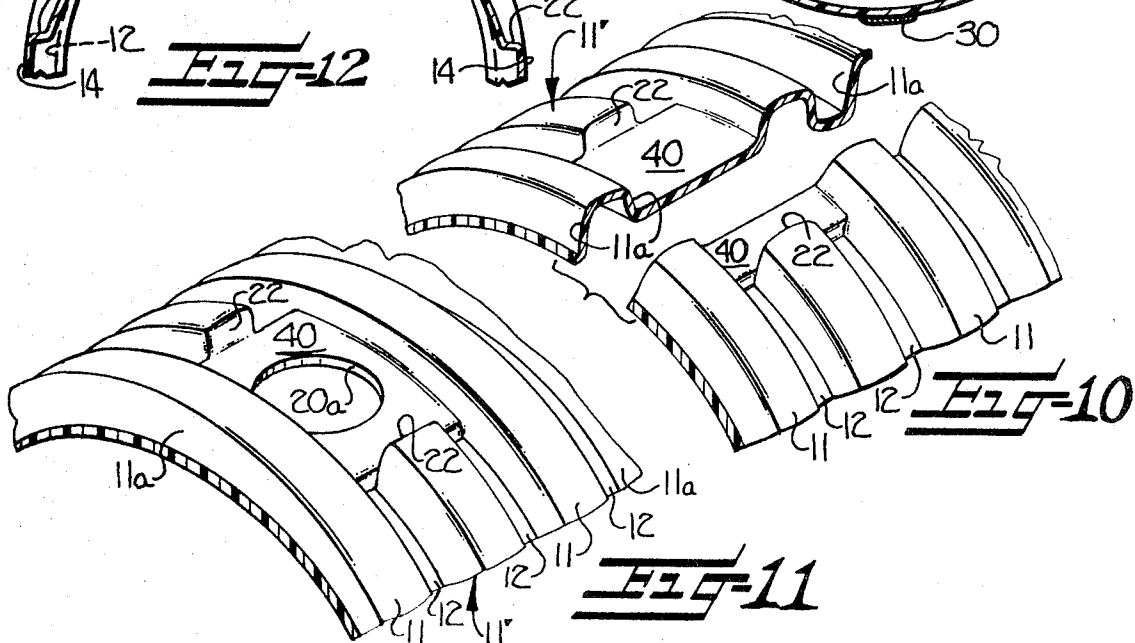
14 Claims, 12 Drawing Figures



SHEET 1 OF 2



SHEET 2 OF 2



CORRUGATED DRAINAGE PIPE WITH PLATEAUS DEFINING RECESSES

This application is a continuation-in-part of my co-pending application Ser. No. 228,508, filed Feb. 23, 1972, entitled CORRUGATED DRAINAGE PIPE.

This invention relates to resilient plastic corrugated drainage pipe and it is an object of this invention to provide an improved drainage pipe especially for use with septic tanks, for example, and wherein the pipe is of lightweight construction.

Briefly stated, this invention differs over my earlier aforementioned invention by positioning recessed wall portions or plateaus, which define interruptions in certain interrupted ribs, at a level intermediate that of the peripheries of the ribs and the valley portions, instead of being contiguous or co-planar with the valley portions as in my earlier invention.

For reasons to be pointed out later in somewhat more detail, this relocation of the recessed portions defining the interruptions in certain interrupted ribs, provides a number of benefits over my earlier invention, such as, facilitating the molding of the pipe by reducing the interior surface area of the pipe to thus reduce the sticking of the pipe as it is moved along the mold core during formation thereof in a continuous molding operation. Further, it has been determined from compressive tests that the strength of the pipe is increased due to the plateau nature of the recessed wall portions wherein side walls extend therefrom inwardly toward the axis and interconnect the recessed wall portions with the valley portions. Also, added compressive strength is obtained by providing end walls on opposite ends of the recessed wall portions which extend radially outwardly to the periphery of the interrupted rib instead of at a taper or incline thereto, as in my earlier invention.

Further, it has been determined that the recessed wall portions formed in accordance with this invention are of thinner construction and thus more readily dissipate heat and are easier and cooler to drill drainage holes therein, bearing in mind that the holes are normally drilled in the pipe while the pipe is somewhat hot to the touch and while the pipe is being continuously moved forwardly from the mold.

In view of the foregoing, it is a more specific object of this invention to provide an improved corrugated resilient plastic drainage pipe so constructed as to enhance the compressive strength thereof and to facilitate the molding thereof and the subsequent drilling of drainage holes therein.

Some of the objects and advantages of the invention having been stated, others will appear as the description proceeds when taken in connection with the accompanying drawings in which

FIG. 1 is an elevational view of a length of corrugated drainage pipe in accordance with this invention, viewed from the bottom of the pipe;

FIG. 2 is a cross-sectional view of the drainage pipe taken along line 2—2 of FIG. 1;

FIG. 3 is a cross-sectional view of the drainage pipe corresponding to FIG. 2 prior to the drilling of drainage holes therein;

FIG. 4 is an enlarged fragmentary perspective view with parts broken away illustrating a recessed wall portion prior to providing a drainage hole therein;

FIG. 5 is a fragmentary perspective view similar to FIG. 4 with a drainage hole in the recessed wall portion;

FIG. 6 is a cross-sectional view similar to FIG. 3 but wherein the recessed wall portions are formed on a radius greater than the radius of the pipe; and

FIGS. 7 to 12 illustrate a modified form of this invention with the respective views corresponding to FIGS. 1 to 6.

Referring now more particularly to the first form of the invention, as illustrated in FIGS. 1 to 6, reference numeral 10 broadly indicated a corrugated drainage pipe in accordance with this invention which is formed of a plastic material, such as polyethylene, and wherein the wall thickness of the pipe is no greater than about one-sixteenth inch to provide a pipe of lightweight construction.

Successively arranged ribs 11 with interconnecting valley portions 12 therebetween define annular corrugations along the periphery of the pipe, with the number of ribs and valley portions per linear foot being about seventeen in number and with the majority of the ribs being uninterrupted and successively arranged in spaced groups of five with an interrupted rib 11' between adjacent groups. Further, it should be noted that the ribs 11 are somewhat wider than the valley portions 12 and are provided with side wall portions 11a which connect with the valley portions.

Referring now to the interrupted ribs 11', it will be noted that each interrupted rib comprises a set of three circularly arranged spaced apart arcuate rib segments, as indicated by numerals 14, 15 and 16, respectively, with the respective rib segments forming each of the interrupted ribs 11' being correspondingly arranged throughout the pipe so as to be in longitudinal alignment with each other.

Recessed wall portions or plateaus 21 extend between and interconnect adjacent arcuate rib segments 14, 15 and 16, respectively, with the recessed wall portions shown as being of a width corresponding to the medial portion of the adjacent arcuate rib segments. End walls 22 are provided at opposite ends of the recessed wall portions 21 and extend outwardly and define the arcuate extent of the interruptions in the interrupted ribs 11'. Further, it will be noted that the end walls 22 extend outwardly along a radius of the pipe, to thus provide enhanced compressive strength to the segmental ribs 14, 15 and 16, as compared to my earlier invention wherein the end walls are beveled and extend at an angle to the radius of the pipe.

For further enhancing the compressive strength of the pipe 10, it will be noted that each of the recessed wall portions 21 has side walls 23 extending inwardly toward the axis of the pipe from opposite sides of the recessed wall portions 21 and interconnect the same with said valley portions 12. Thus, as earlier noted, the recessed wall portions 21 may be characterized as plateaus, since they are positioned outwardly from the valley portions at a level intermediate the peripheries of the valley portions and the peripheries of the ribs.

Between the ends of arcuate rib segments 14, 15 and 16 and extending through the recessed wall portions 21 is a series of three drainage holes, identified at 20, 20a and 20b, which are located around the bottom half of the pipe, when the pipe is properly installed in the ground, so that the rib segments 14, 15 and 16 projecting outwardly therefrom serve to space the drainage holes from the earth for effecting proper drainage therethrough. Furthermore, it will be noted that the rib segment 14 is desirably longer than the other two seg-

ments and has an arcuate extent encompassing at least the upper half of the drainage pipe, i.e., at least 180°, and preferably is of an extent of at least 200° to 220° so as to shieldingly protect drainage holes 20 and 20b during the backfilling of the earth around the drainage pipe to avoid blocking the holes.

For aiding in properly installing the drainage pipe, sight means 30 (FIG. 2) is preferably provided longitudinally of the pipe along the surface thereof in direct opposition to the drainage hole 20a for visually aiding in installing the pipe in the ground with the drainage holes properly positioned lowermost. As illustrated, sight means 30 is in the form of a painted line contrasting with the color of the drainage pipe but may, if desired, be in the form of a series of small rib portions extending longitudinally of the pipe along the outer surface of the ribs.

Referring now more particularly to the set of arcuate rib segments 14, 15 and 16, which comprise each of the interrupted ribs 11', as noted earlier, rib segment 14 is desirably of an arcuate extent exceeding 180° for shieldingly protecting the drainage holes. The shorter rib segments 15 and 16 are preferably of the same length as each other and each, as illustrated, has an arcuate extent of about 20 to 25 degrees. Preferably, as illustrated, the respective arcuate segments 14, 15 and 16 are uniformly spaced from each other so as to readily accommodate similar size drainage holes therebetween which drainage holes are of at least ½ inch diameter and preferably ¾ inch diameter.

At this point, it should be noted that the drainage holes, as illustrated, have a diameter greater than the width of the ribs and extend into the valley portions adjacent opposite sides of the recessed wall portions 21. Thus, the drainage holes extend through two levels of the wall of the pipe, namely, the recessed wall portions 12 on an intermediate level and the valley portions 12 on a lower level. This arrangement effectively increases the size of the drainage holes, as is best understood from viewing FIG. 5.

As illustrated, the drainage holes 20, 20a and 20b each extend through an arcuate extent of the pipe of about 15° to 25° and, as earlier noted, have a diameter greater than the width of the ribs. As illustrated in FIG. 4, intersecting axes of adjacent drainage holes define an included angle of about 60° as indicated at A.

Referring now to the modification of the first form of the invention, as illustrated in FIG. 6, a comparison of this figure with FIG. 3 will indicate that the recessed wall portions 21a are flatter and of less curvature than the recessed wall portions 21. As earlier noted, the recessed wall portions 21 are arcuate and formed of a radius generated about the axis of the pipe 10. On the other hand, the recessed wall portions 21a while also being arcuate are formed on a radius greater than the radius of the pipe 10 so that the central areas of the recessed wall portions 21a are positioned closer to the axis of the pipe than other areas thereof. This arrangement of the recessed wall portions 21a permits positioning drainage holes therethrough with the holes being located closer to the interior of the pipe than is the case with recessed wall portions 21. However, it is to be particularly noted that in both instances, the recessed wall portions 21 and 21a are located at a level intermediate that of the peripheries of the ribs and the valley portions.

As earlier noted, the recessed wall portions 21 and 21a by being formed at a level intermediate the peripheries of the ribs and the valley portions results in thinner recessed walls as compared to pipes constructed in accordance with my earlier invention, wherein the recessed wall areas were contiguous or co-planar with the valley portions. The reason for this thinner wall construction is due to the redistribution of the plastic material into forming not only the recessed wall portions 21 and 21a but also the side wall portions 23 interconnecting the same to the valley portions. Thus, there is a greater wall surface area of pipes provided with recessed wall portions in accordance with the instant invention than in my prior invention. At this point, it should be kept in mind that the amount of material fed into a mold for continuously making corrugated pipe is governed by the amount of material needed for forming the overall rib and valley structure of the pipe. Thus, where the ribs are interrupted, as at 11', the same amount of material is fed into the mold by the extruding machine, as in the areas where the ribs are uninterrupted.

Further, as also noted earlier, this thinner construction for the recessed wall portions 21, 21a, results in less heat retention due to less thickness of material being present and thus permits presenting the continuously molded pipe to a drilling station in a less heated or tacky condition. This permits the drills to drill holes of greater uniformity of size and at the same time more effectively operate without being overheated by the build up of heat transferred from the pipes being drilled.

Referring now to the second embodiment of the invention, broadly identified by 10', as illustrated in FIGS. 7 to 12, the same reference numerals have been employed for all of the elements that are the same as the first embodiment, i.e., except for the recessed wall portions interrupting the ribs 11'. These recessed wall portions are identified in this embodiment of the invention by reference numeral 40 and basically differ over the recessed wall portions 21 and 21a of the first embodiment of the invention by being of a wider extent by extending outwardly into and interrupting the valley portions adjacent thereto. As illustrated, the recessed wall portions 40 have a collective width approximately equal to the width of a rib and two valley portions. It will be noted, with particular reference to FIGS. 7, 10 and 11, that the portions of the recessed wall 40 which extend into and interrupt the valley portions 12 have radially extending end walls 41 connecting the same to the periphery of the valley portions 12.

Referring now to FIG. 12, which corresponds with the modification of FIG. 6 in the first embodiment of the invention, it will be noted that the recessed wall portion is identified as 40a and differs from the recessed wall portion 40 by being of a flatter curvature by being formed on a radius greater than the radius of the pipe so that central areas of recessed wall portions 40a are positioned closer to the axis of the pipe than other areas thereof. As earlier noted, this permits positioning the drainage holes therethrough so as to lie closer to the axis of the pipe.

It should thus be apparent from the foregoing that the instant invention permits obtaining a corrugated plastic drainage pipe of higher compressive strength than my earlier invention and, additionally, facilitates the molding thereof by reducing the interior surface areas of the

pipe to avoid sticking on the core of the mold as the pipe is being moved therealong. Also, as earlier noted, pipes constructed in accordance with this invention have thinner walls for the recessed wall portions for thus aiding in cooling the pipe and the drilling of drainage holes in the recessed areas.

In the drawings and specification there have been set forth preferred embodiments of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only.

That which is claimed is:

1. A resilient plastic drainage pipe having spaced apart successively arranged ribs with interconnecting valley portions therebetween defining annular corrugations along the periphery of the pipe, the majority of said ribs being uninterrupted and arranged in spaced groups with an interrupted rib between adjacent groups, and each interrupted rib having at least one elongate recessed wall portion defining an interruption therein positioned at a level intermediate that of the peripheries of said ribs and said valley portions.

2. A resilient plastic drainage pipe according to claim 1, wherein a drainage hole is provided in each recessed wall portion of each interrupted rib with the diameter of the hole being greater than the width of the ribs.

3. A resilient plastic drainage pipe according to claim 1, wherein said recessed wall portion has a width at least as wide as the medial portion of the interrupted rib.

4. A resilient plastic drainage pipe according to claim 1, wherein side walls extend radially inwardly from opposite sides of said recessed wall portion and interconnect the same with said valley portions.

5. A resilient plastic drainage pipe according to claim 1, wherein said recessed wall portion in each interrupted rib extends outwardly into and interrupts the valley portions adjacent thereto.

6. A resilient plastic drainage pipe having spaced apart successively arranged ribs with interconnecting valley portions therebetween defining annular corrugations along the periphery of the pipe, the majority of said ribs being uninterrupted and arranged in spaced groups with an interrupted rib between adjacent groups, each interrupted rib comprising a set of three circularly arranged spaced apart arcuate rib segments correspondingly arranged throughout the pipe, one rib segment of each set being substantially longer than the other two rib segments and having an arcuate extent of at least 180°, and recessed wall portions extending between and interconnecting adjacent arcuate rib segments, said recessed wall portions being of a width at least as wide as the medial portion of said arcuate rib segments and positioned at a level intermediate that of the peripheries of said ribs and said valley portions.

7. A resilient plastic drainage pipe according to claim 6, wherein a drainage hole is provided in each of said recessed wall portions of each interrupted rib with the diameter of the hole being greater than the width of the rib.

8. A resilient plastic drainage pipe according to claim 6, wherein said recessed wall portions are arcuate and of a radius generated about the axis of the pipe.

9. A resilient plastic drainage pipe according to claim 6, wherein said recessed wall portions are arcuate and of a radius greater than the radius of the pipe so that central areas of the recessed wall portions are positioned closer to the axis of the pipe than other areas thereof.

10. A resilient plastic drainage pipe according to claim 6, wherein side walls extend radially inwardly from opposite sides of said recessed wall portions and interconnect the same with said valley portions.

11. A resilient plastic drainage pipe according to claim 6, wherein said recessed wall portions in each interrupted rib extend outwardly into and interrupt the valley portions adjacent thereto.

12. A resilient plastic drainage pipe having spaced apart successively arranged ribs with interconnecting valley portions therebetween defining annular corrugations along the periphery of the pipe, the majority of said ribs being uninterrupted and arranged in spaced groups with an interrupted rib between adjacent groups, each interrupted rib comprising a set of three circularly arranged spaced apart arcuate rib segments correspondingly arranged throughout the pipe, one rib segment of each set being substantially longer than the other two rib segments and having an arcuate extent of at least 180°, elongate recessed wall portions extending between and interconnecting adjacent arcuate rib segments, said recessed wall portions being positioned at a level intermediate that of the peripheries of said ribs and said valley portions, a drainage hole provided in each of said recessed wall portions, and end wall portions extending radially outwardly from opposite ends of each recessed wall portion to the periphery of the interrupted rib to define the arcuate extent of the interruptions.

13. A resilient plastic drainage pipe having spaced apart successively arranged ribs with interconnecting valley portions therebetween defining annular corrugations along the periphery of the pipe, the majority of said ribs being uninterrupted and arranged in spaced groups with an interrupted rib between adjacent groups, each interrupted rib having at least one elongate recessed wall portion defining an interruption therein and positioned at a level intermediate that of the peripheries of said ribs and said valley portions, side walls extending radially inwardly from opposite sides of said recessed wall portion and interconnecting the same with said valley portions, and a drainage hole provided in each recessed wall portion.

14. A resilient plastic drainage pipe according to claim 13, wherein end walls extend radially outwardly from opposite ends of said recessed wall portion to the periphery of the interrupted rib and define the arcuate extent of the interruption.

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