# United States Patent [19]

**Maroschak**

[11] **3,861,152**

[45] **Jan. 21, 1975**


[54] **CORRUGATED DRAINAGE PIPE WITH STAGGERED ARRANGEMENT OF PLATEAU RECESSES**


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[22] Filed: **July 19, 1973**

[21] Appl. No.: **380,904**

**Related U.S. Application Data**

[63] Continuation-in-part of Ser. No. 262,103, June 12, 1972, Pat. No. 3,747,352, which is a continuation-in-part of Ser. No. 228,508, Feb. 23, 1972, Pat. No. 3,802,202.

[52] **U.S. Cl.** ..... **61/11,** 61/72.1, 138/121, 138/173

[51] **Int. Cl.** ..... **E02b 11/00,** F16l 11/12

[58] **Field of Search** ..... 61/11, 10, 12, 13, 72.1; 138/105, 121, 173, 178



[56] **References Cited**

UNITED STATES PATENTS

3,747,352 7/1973 Maroschak ..... 61/10



*Primary Examiner*—Jacob Shapiro

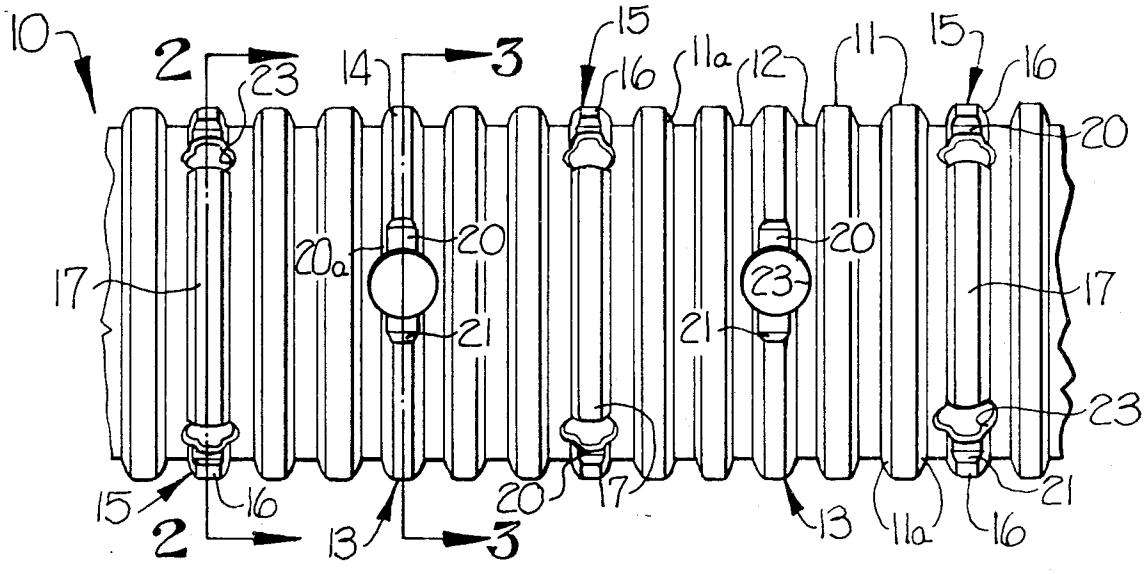
*Attorney, Agent, or Firm*—Parrott, Bell, Seltzer, Park & Gibson



[57] **ABSTRACT**

A resilient plastic drainage pipe of lightweight construction having spaced apart successively arranged annular ribs with interconnecting annular valley portions therebetween defining corrugations along the periphery of the pipe, the ribs being arranged in successive groups with each of the successive groups of ribs having at least several of the ribs interrupted by elongate recessed wall portions positioned at a level intermediate that of the peripheries of the ribs and the valley portions. The elongate recessed wall portions in each group of ribs are arcuately spaced from one another and positioned at three arcuately spaced locations in the lower half of the pipe with drainage holes provided in the elongate recessed wall portions, and with at least one of the elongate recesses in each group being offset longitudinally from an elongate recess in another rib in the group.


**11 Claims, 7 Drawing Figures**



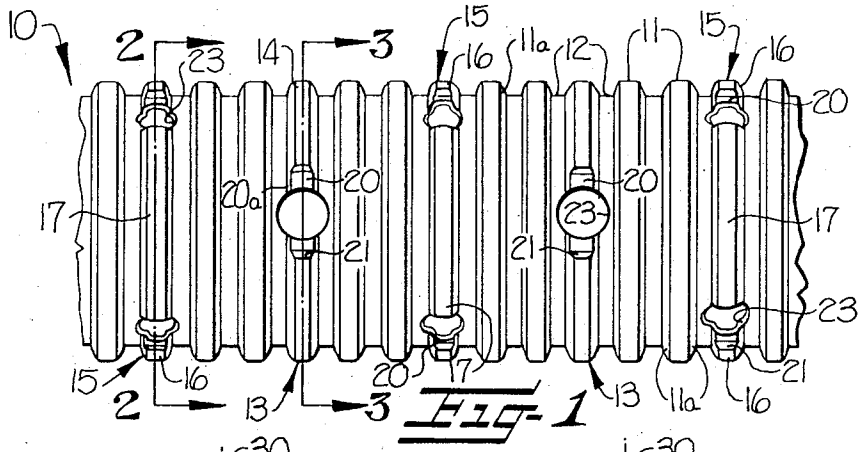



Fig- 1

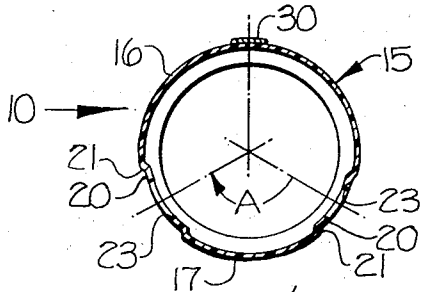



Fig- 2

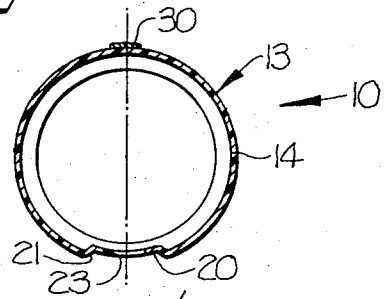



Fig- 3

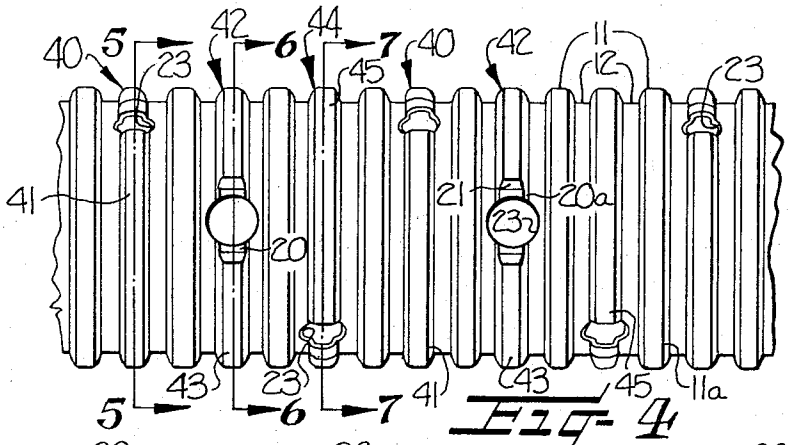



Fig- 4

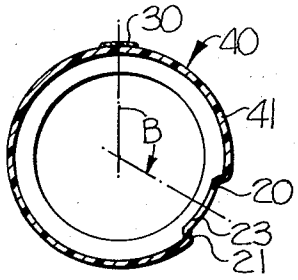



Fig- 5

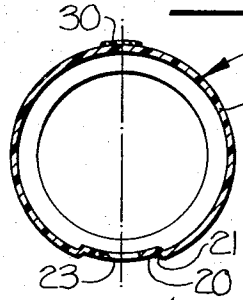



Fig- 6

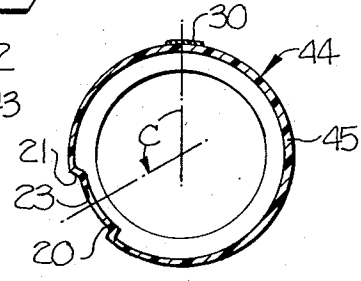



Fig- 7

# CORRUGATED DRAINAGE PIPE WITH STAGGERED ARRANGEMENT OF PLATEAU RECESSES

This application is a continuation-in-part of my copending application Ser. No 262,103, filed June 12, 1972, entitled CORRUGATED DRAINAGE PIPE WITH PLATEAUS DEFINING RECESSES, now U.S. Pat. No. 3,747,352, which application, in turn, is a continuation-in-part of my copending application Ser. No. 228,508, filed Feb. 23, 1972, entitled CORRUGATED DRAINAGE PIPE now U.S. Pat. No. 3,802,202.

This invention relates to resilient plastic corrugated drainage pipe and it is an object of this invention to provide an improved drainage pipe of lightweight construction particularly adapted for use with septic tanks.

In my earlier copending application Ser. No. 262,103, filed June 12, 1972 a corrugated plastic drainage pipe is disclosed wherein a series of three arcuately spaced recessed wall portions or plateaus are provided in certain ribs of the pipe defining interruptions therein with the remaining ribs in the pipe being uninterrupted. A drainage hole is provided in each of the recesses or plateaus in the interrupted ribs to allow liquids to drain from the pipe. The present invention differs over my earlier copending application by providing the recessed wall portions or plateaus in groups in arcuately spaced and longitudinally staggered relation so that at least one of the elongate recesses in each group is longitudinally spaced from other recesses in the same group.

The longitudinally staggered, arcuately spaced arrangement of the recesses or plateaus in accordance with the present invention provides several benefits over the arrangement disclosed in my earlier copending application, as for example, facilitating drilling the drainage holes in the pipe, since the drilling machines for forming the drainage holes in the pipe may be staggered longitudinally from one another. Additionally, since the drainage holes are distributed along the length of the pipe rather than being grouped in a common rib, liquids may drain from the pipe uniformly along its length rather than from spaced locations therealong as in my earlier application. Finally, the compressive strength of the pipe is improved, since the drainage holes and the elongate recesses or interruptions in the ribs, which inherently form somewhat weaker areas in the walls of the pipe than the uninterrupted portions thereof, are distributed more over the length of the pipe rather than being concentrated in selected ribs thereof.

In view of the foregoing, it is a more specific object of this invention to provide an improved corrugated resilient plastic drainage pipe having recessed wall portions or plateaus provided in the ribs thereof in staggered relation along the length of the pipe.

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 a bottom plan view of a length of corrugated drainage pipe in accordance with one form of the present invention, showing the drainage holes in the underside thereof;

FIG. 2 is a vertical sectional view of the drainage pipe taken along the line 2-2 of FIG. 1, and shown with the pipe in its normal orientation with the drainage holes in the lower half thereof;



FIG. 3 is a vertical sectional view similar to FIG. 2 but taken along the line 3—3 of FIG. 1;

FIG. 4 is a bottom plan view of a length of corrugated drainage pipe in accordance with a second form of this invention, showing the drainage holes in the underside thereof;

FIG. 5 is a vertical sectional view of the drainage pipe taken along line 5—5 of FIG. 4 and shown with the pipe in its normal orientation with the drainage holes in the lower half thereof;

FIG. 6 is a vertical sectional view similar to FIG. 5 but taken along the line 6—6 of FIG. 4; and

FIG. 7 is a vertical sectional view similar to FIG. 5 but taken along line 7—7 of FIG. 4.

Referring now to the first form of the invention, as illustrated in FIGS. 1–3, reference numeral 10 broadly indicates a corrugated drainage pipe in accordance with this invention which is formed of a plastic material such as polyethylene, with the wall thickness thereof preferably being no greater than about 1/16 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 ribs 11 being somewhat wider than the valley portions 12 and being provided with side wall portions 11a which connect with the valley portions 12. As illustrated, the ribs are arranged in successive groups of six ribs with two of the ribs in each group being interrupted by arcuately elongate recessed wall portions 20 and with the remaining four ribs in the group being uninterrupted and located in pairs between successive interrupted ribs.

It will be noted from FIG. 1 that two types of interrupted ribs are provided, with alternate ones of the interrupted ribs, broadly designated at 13, having a single recessed wall portion 20 therein and having an elongate arcuate rib segment 14 forming the remaining portion of the interrupted rib 13, and with the remaining interrupted ribs, designated at 15, having two arcuately spaced recessed wall portions 20 therein with a relatively long arcuate rib segment 16 and a relatively short arcuate rib segment 17 interconnecting the two recessed wall portions and forming the remaining portions of the interrupted rib 15.

Each of the arcuately elongate recessed wall portions 20 are positioned radially outwardly from the axis of the pipe at a level intermediate that of the peripheries of the ribs 11 and valley portions 12, with end walls 21 at opposite ends of the recessed wall portions 20 extending outwardly and defining the arcuate extent of the interruptions in the interrupted ribs and serving to provide compressive strength to the adjacent rib segments. As illustrated, recessed wall portions 20 have a width corresponding to the medial portion of the adjacent arcuate rib segments with side wall portions 20a extending radially inwardly toward the axis of the pipe from opposite sides of the recessed wall portions 20 and interconnecting the same with adjacent valley portions 12 and thereby serving to provide compressive strength to the recessed wall portions of the interrupted ribs. The recessed wall portions 20 may be characterized as plateaus, since they are positioned outwardly from the valley portions at a level intermediate the periphery of the valley portions and the peripheries of the ribs.

As illustrated, the pipe is adapted for being used for drainage purposes, as for example in a septic tank field,

and a drainage hole **23** is provided through each of the recessed wall portions **20** in the pipe to permit liquids to flow from the pipe. However, since corrugated plastic pipe is also conventionally used for various purposes without drainage holes therein, it may in some instances be economically desirable to omit the drainage holes from the recessed wall portions **20** and to thereby employ the same molding apparatus and mold blocks for forming solid or unperforated pipe as for forming drainage pipe having holes therein.

When the pipe is to be employed for drainage purposes, the holes provided therein are of at least ½ inch diameter, and preferably about ¾ inch diameter so that the holes are of greater diameter than the width of the recessed wall portions **20** and extend into the valley portions adjacent opposite sides of the recessed wall portions **20.** Thus, the drainage holes will extend through two levels of the wall of the pipe, namely the recessed wall portions **20** on an intermediate level and the valley portions **12** on a lower level, and will thereby effectively increase the size of the drainage holes.

By locating the drainage holes in recessed portions of the pipe, the drainage holes are spaced inwardly from the periphery of the ribs and away from the surrounding soil when installed underground, which facilitates the drainage of liquids from the pipe.

Throughout the length of the pipe, the interrupted ribs **13, 15** in the successive groups of ribs are correspondingly arranged so as to position the respective recessed wall portions or plateaus **20** in longitudinally aligned rows at three arcuately spaced locations in the same half of the pipe. As seen in FIG. **1,** the recessed wall portions **20** in successive interrupted ribs **13** are located at the middle or innermost location of the three arcuately spaced locations, with the two arcuately spaced recessed wall portions **20** in succesive interrupted ribss **15** ribs located in longitudinally offset, arcuately spaced relation on opposite sides thereof in the outermost of the three arcuately spaced locations.

When the drainage pipe is properly installed in the ground, the drainage holes **23** are located in the lower half of the pipe to permit drainage of liquids therefrom into the earth below. For visually aiding in installing the pipe in the ground with the drainage holes properly oriented lowermost, sight means **30** (FIGS. **2** and **3**) is preferably provided longitudinally of the pipe in diametrically opposed relation to the drainage hole in interrupted rib **13,** which as previously noted, is in the middle or innermost of the three arcuately spaced locations. 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 more particularly to interrupted rib **15,** rib segment **16** thereof, as noted earlier, is of greater arcuate extent than the other rib segment **17.** Rib segment **16** desirably has an arcuate extent encompassing at least the upper half of the drainage pipe, i.e., at least 180 degrees, and preferably has an extent of at least 200 to 220 degrees so as to shieldingly protect the two drainage holes **23** during the backfilling of earth around the drainage pipe to avoid blocking the holes. As illustrated (FIG. **2**), the intersecting axes of the arcuately spaced holes in interrupted rib **15** define an included angle of about **120** degrees (angle A), with each drainage hole also being arcuately spaced about 120 degrees from the top of the pipe where sight means **30** is located.

Each elongate recessed wall portion preferably has an arcuate extent of about 35–50 degrees to provide sufficient room for drilling drainage holes **23** therein, which as illustrated, encompass an arcuate extent of about 15 to 25 degrees and are preferably centered in the elongate recessed wall portions. The additional arcuate extent of the elongate recessed wall portions serves to provide a degree of tolerance for minor misalignment of the pipe with respect to the drilling apparatus during the drilling operation.

Referring to interrupted rib **13,** it will be noted that the recessed wall portion **20** thereof has an arcuate extent similar to that of the recesses in interrupted rib **15,** with arcuate rib segment **14** comprising the remaining portion of the interrupted rib. As illustrated, drainage hole **23** in rib **15** is located lowermost in the pipe about 180 degrees from the top of the pipe where sight means **30** is located. Thus, as illustrated in FIG. **1,** the drainage holes in the pipe collectively cover an arcuate extent of about 120 degrees in the lower portion of the pipe and form three longitudinally aligned rows of drainage holes, which rows are arcuately spaced about 60 degrees apart from each other.

The second form of the invention, as illustrated in FIGS. **4–7,** is similar to the first form illustrated in FIGS. **1–3,** and the same reference numerals have been employed for like elements where applicable, except that the three interrupted ribs in each group of six ribs are identified by the reference numerals **40, 42** and **44** respectively.

Referring to FIG. **4,** it will be noted that the ribs **11** are arranged in successive groups of six ribs with three of the ribs in each group (**40, 42, 44**) being interrupted by a recessed wall portion **20,** and with the remaining three ribs in each group being uninterrupted and located between successive interrupted ribs. The recessed wall portion in each of the interrupted ribs **40, 42, 44** has an arcuate extent of about 35–50 degrees, with elongate arcuate rib segments **41, 43, 45** respectively, comprising the remaining portions of the respective interrupted ribs.

As in the first form of the invention, the interrupted ribs (**40, 42, 44**) are correspondingly arranged throughout the length of the pipe so as to position the respective recessed wall portions or plateaus in three longitudinally aligned rows at three arcuately spaced locations in the same half of the pipe. The recessed wall portion in interrupted rib **42** is located at the middle or innermost location of the three arcuate locations, with the recessed wall portion in interrupted rib **40** being located on one side thereof, and with the recessed wall portions in interrupted rib **44** being located on the opposite side thereof. Sight means **30** is also preferably provided in diametrically opposed relation to the drainage holes in interrupted rib **42** for visually aiding in installing the pipe in the ground with the drainage holes properly positioned lowermost.

As illustrated, the drainage hole in interrupted rib **40** is located in the recessed wall portion **20** on one side of the pipe and arcuately spaced about 120 degrees from the top of the pipe where sight means **30** is located (angle B in FIG. **5**), while the drainage hole in interrupted rib **44** is located in the recessed wall portion **20** on the opposite side of the pipe and also spaced about **120** degrees from the top of the pipe (angle C in

FIG. 7). As previously noted, the drainage hole in interrupted rib **42** is positioned in diametrically opposed relation to sight means **30** at the top of the pipe.

Thus, as seen in FIG. **4**, the drainage holes collectively cover an arcuate extent of about 120 degrees in the lower portion of the pipe and form three longitudinally aligned rows of holes which are arcuately spaced about 60 degrees apart from each other.

It will be noted that in both of the illustrated forms of this invention, at least one of the drainage holes in each group of ribs is in longitudinally offset or staggered relation with respect to another drainage hole in the group with no two drainage holes being positioned closely adjacent one another in the same rib. Thus, the inherent weaknesses in the wall of the pipe formed by the drainage holes and the recessed wall portions are distributed throughout the length of the pipe rather than being concentrated in a single rib as in my aforementioned earlier-filed copending application. It should be apparent from the foregoing that the instant invention thus provides a corrugated plastic drainage pipe of enhanced compressive strength as compared to my earlier invention disclosed in the aforementioned copending application.

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 and not for purposes of limitation.

That which is claimed is:

**1.** A resilient plastic pipe having spaced apart successive annular ribs with annular valley portions therebetween defining corrugations along the periphery of the pipe, said ribs being arranged in successive groups with each of the successive groups of ribs having at least several ribs in the group interrupted by elongate recessed wall portions positioned at a level intermediate that of the peripheries of said ribs and said valley portions, and wherein the respective elongate recessed wall portions in each group of ribs are arcuately spaced from one another with at least one of the elongate recessed wall portions being offset longitudinally of the pipe from an elongate recessed wall portion in another rib of the group.

**2.** A resilient plastic pipe according to claim **1**, wherein drainage holes are provided in the elongate recessed wall portions in each group of ribs with the diameter of the holes being greater than the width of the ribs.

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

**4.** A resilient plastic pipe according to claim **1** wherein at least one uninterrupted rib is positioned between adjacent interrupted ribs throughout the pipe.

**5.** A resilient plastic pipe according to claim **1**, wherein the respective elongate recessed wall portions in each group of ribs are each offset longitudinally of the pipe from one another.

**6.** A resilient plastic pipe according to claim **1** wherein two of the elongate recessed wall portions in each group of ribs are located in a common interrupted rib and wherein the remaining elongate recessed wall portion in each group of ribs are offset longitudinally of the pipe from said common interrupted rib.

**7.** A resilient plastic pipe having spaced apart successive annular ribs with annular valley portions therebetween defining corrugations along the periphery of the pipe, said ribs being arranged in successive groups with each of the successive groups of ribs having at least several ribs in the group interrupted by arcuately elongate recessed wall portions positioned at a level intermediate that of the peripheries of said ribs and said valley portions, the elongate recessed wall portions in each group of ribs being three in number and being arcuately spaced apart from each other at three arcuate locations in the lower half of the pipe, and with the elongate recessed wall portions in adjacent groups of ribs being positioned in similar arcuate locations, and wherein at least one of the elongate recessed wall portions in each group of ribs is offset longitudinally of the pipe from an elongate recessed wall portion in another rib of the group.

**8.** A resilient plastic pipe according to claim **7**, wherein a drainage hole is provided in each of the three arcuately spaced recessed wall portions in each group of ribs with the diameter of the holes being greater than the width of the ribs.

**9.** A resilient plastic pipe according to claim **8**, wherein the drainage holes in each group of ribs are arcuately spaced from each other about **60** degrees apart, and wherein sight means is provided on the outer surface of said pipe extending longitudinally thereof and located in diametrically opposed relation to the middle location of the arcuately spaced drainage holes in the pipe, said sight means being thereby adapted for visually aiding in installing the pipe in the ground with all of the drainage holes located below the horizontal center line of the pipe and with the middle drainage holes occupying the lowermost position.

**10.** A resilient plastic pipe according to claim **7**, wherein each group of ribs includes three interrupted ribs with an uninterrupted rib being provided between adjacent interrupted ribs, and wherein each of the three interrupted ribs has one of said elongate recessed wall portions provided therein with said recessed wall portions being located respectively at said three different arcuate locations on the pipe.

**11.** A resilient plastic pipe according to claim **7**, wherein each group of ribs includes two longitudinally spaced interrupted ribs with a pair of uninterrupted ribs being provided therebetween, and wherein two of the elongate recessed wall portions in each group of ribs are positioned in a common interrupted rib in arcuately spaced relation in the outermost of said three arcuate locations, with the third elongate recessed wall portion being positioned in the other interrupted rib and located in the middle of said three arcuate locations.

* * * * *