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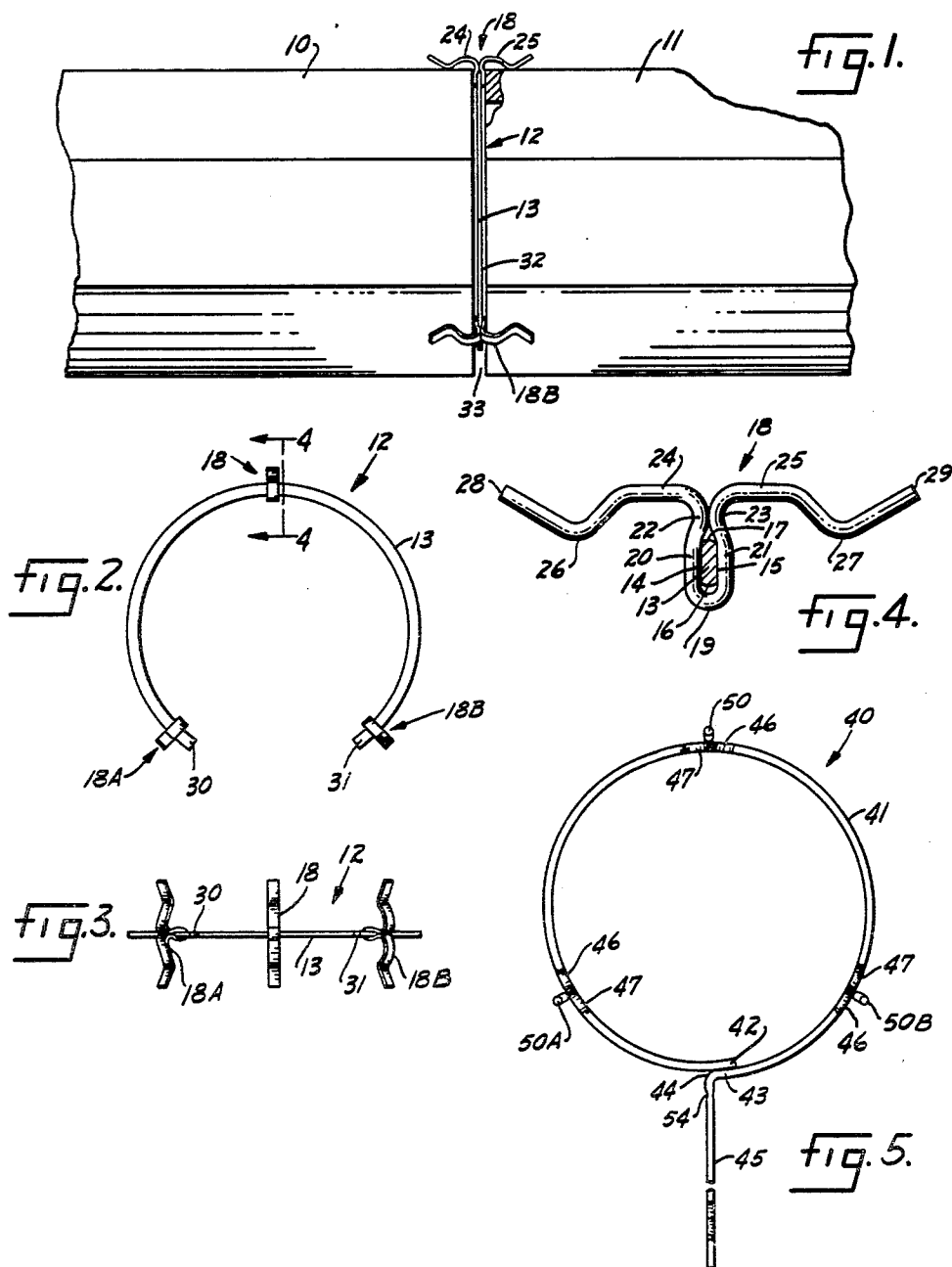
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ALIGNING TILE SPACER

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2 Sheets-Sheet 1



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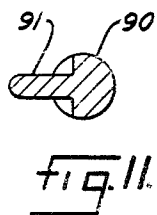
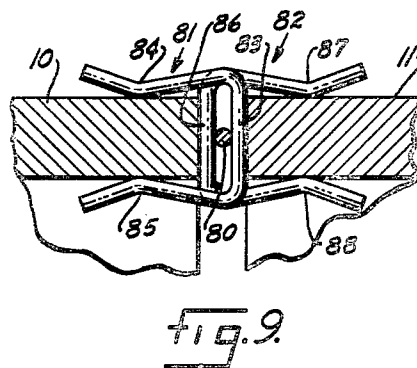
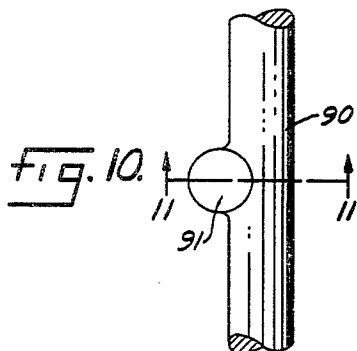
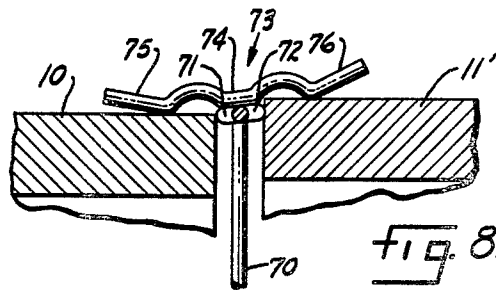
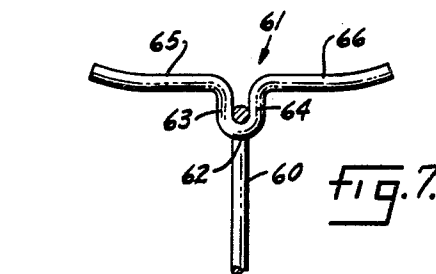
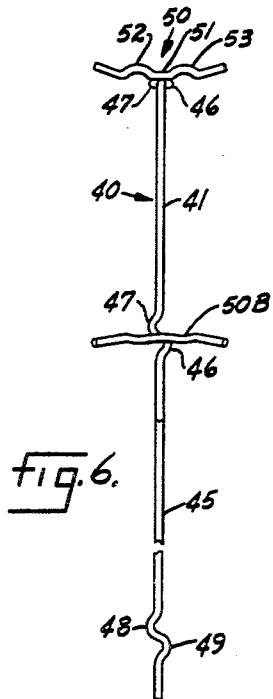
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2 Sheets-Sheet 2



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ALIGNING TILE SPACER

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5 Claims. (Cl. 61—13)

The present invention relates to an aligning tile spacer, and is primarily concerned with the provision of means, which must necessarily be quite inexpensive in manufacture and extremely simple, yet stable and effective, in use, for establishing and maintaining substantial alignment between the adjacent ends of successive drain tile, while establishing and maintaining an open and substantially unobstructed space between such adjacent tile ends.

Further objects and advantages of the disclosed invention will appear as the description proceeds.

To the accomplishment of the above and related objects, our invention may be embodied in the forms illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that change may be made in the specific constructions illustrated and described, so long as the scope of the appended claims is not violated.

Fig. 1 is a fragmentary side elevation of a pair of adjacent tile elements with one embodiment of our invention operatively associated therewith to establish axial alignment and optimum spacing between the adjacent ends;

Fig. 2 is an end elevation of the spacer element shown in Fig. 1;

Fig. 3 is a bottom plan view thereof;

Fig. 4 is a section taken substantially on the line 4—4 of Fig. 2 and drawn to an enlarged scale;

Fig. 5 is an end elevation of a modified form of our invention;

Fig. 6 is a side elevation thereof seen from the right of Fig. 5;

Fig. 7 is a fragmentary section of a further embodiment of our invention;

Fig. 8 is a similar view of a still further form of the invention, with the spacer shown in coactive association with fragments of adjacent tile ends;

Fig. 9 is a similar view of still another form;

Fig. 10 is a fragmentary elevation of a modified form of thickness-increasing means, drawn to an enlarged scale; and

Fig. 11 is a section taken substantially on the line 11—11 of Fig. 10.

Usage and/or sanitary regulations require, in many kinds of installations, one or more runs of tile for conducting waste matter to an absorption point such as, for instance, a tile drainage field. In many such installations, it is necessary that the adjacent ends of successive tile shall be slightly spaced axially from each other; and the degree of such spacing should be quite uniform—preferably, about one-fourth inch. For optimum effectiveness, however, adjacent tile should be in reasonably-accurate axial alignment in order that, whenever any substantial volume of material flows through the line, it may flow freely and without serious obstruction, past the spaces between the ends of adjacent tile. In many installations, the tile is laid in the ditch and is then covered; and it has been found that, in the absence of means disposed between adjacent tilings, the individual tile will frequently shift during, or after, the covering operation,

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thereby destroying proper alignment and spacing of adjacent tile.

According to the present invention, we have provided several forms of devices, adapted to be placed between adjacent tile at the time of laying the same, and effective to prevent such dislodgment of individual tile.

Referring more particularly to the drawings, we have shown, in Figs. 1 to 4, what we presently believe to be an optimum form of aligning tile spacer. We have fragmentarily illustrated adjacent end sections of individual tile 10 and 11, between which is positioned such a spacer, indicated generally by the reference numeral 12. In this form, the spacer comprises an arcuate member 13 formed of flat metal spring wire bent to a proper curvature. The flat faces 14 and 15 of the member 13 face in opposite axial directions, while the rounded edge 16 comprises the internal periphery, and the rounded edge 17 comprises the external periphery of the arcuate member. In its optimum form, the member has a peripheral extent of approximately 290°; but the critical requirement is merely that the peripheral extent of the member 13 shall be more than 180° and less than 360°, for a reason which will become apparent as the description proceeds.

Substantially at its midpoint, the member 13 is embraced by a clip indicated generally by the reference numeral 18 and formed of inherently resilient metal such as wires. Substantially at the midpoint of the clip, the same is rebent as at 19 to provide parallel legs 20 and 21 closely embracing the surfaces 14 and 15 and preferably (though not necessarily) secured thereto as by welding, soldering or the like. Beyond the external periphery of the member 13, the clip portions are bent toward each other, as at 22 and 23, and preferably into engagement with each other. Therebeyond, one leg of the clip is turned to project substantially axially away from the member face 14 to define a clip leg 24, while the other side of the clip is bent to project axially in the opposite direction, away from the face 15 of the member 13 to define a second clip leg 25. The proximal regions of the legs 24 and 25 lie substantially in a common plane outside the external periphery 17 of the member 13; and, because of the inherent resiliency of the material from which the clip 18 and the member 13 are formed, said legs 24 and 25 will frictionally resiliently engage the external surfaces of the tile ends 10 and 11 when the spacer 12 is interposed between such tile ends. Preferably, the radius of curvature of the member 13 will be slightly less than that of the tile with which it is to be used.

Similar clips 18A and 18B are similarly mounted on the member 13 at points respectively oppositely angularly spaced from the clip 18 by more than 90°. In the illustrated embodiment of the invention, the angular spacing between the clip 18 and each of the clips 18A and 18B is approximately 135°, so that each of clips 18A and 18B is quite close to its associated terminus 30 or 31 of the element 13. This particular angular arrangement is selected where the tile with which the spacer is to be used is octagonal in external cross-sectional contour. Where the tile is cylindrical in external contour, an angular spacing of 120° is optimum. The angular spacing between the clip 18 and the respective clips 18A and 18B will be so selected, with respect to the contour of the tile with which it is to be used, that the three clips will effectively hold the spacer against trans-axial movement in any direction with respect to either of the tile with which the clips are engaged.

It will be perceived that, by reason of the clip portions 20 and 21 which bear against the faces 14 and 15 of the member 13, respectively, the effective axial thickness of the spacer is increased at the points of location of the several clips. In order to avoid obstruction of flow

through the interiors of the tile, the radial dimension of the member 13, taken between the edges 16 and 17, is substantially less than the wall thickness of the tile sections 10 and 11; and preferably even the portions 19 of the clips will thus be located outside the flow passage through the tile.

Preferably, and in order to accommodate the spacer to tiles of slightly variable dimensions, the leg 24 of each clip is, at an intermediate portion, bent to incline radially inwardly as at 26, and the leg 25 of each clip is similarly bent as at 27; but the distal ends 28 and 29 of the legs 24 and 25 preferably will be disposed substantially in the common plane of the proximal sections of said legs when the clip is in equilibrium condition.

Because of the thickening of the axial dimension of the spacer at points of attachment of the several clips, clearance is provided, throughout substantially the entire periphery of the tile, as at 32, between each tile end and the member 13. In order to insure optimum drainage, however, the lower portion of the joint is entirely unobstructed, as at 33, in this optimum form of spacer, because the opposite ends 30 and 31 of the member 13 are spaced apart by about 70°.

In Figs. 5 and 6, we have shown a modified form of spacer indicated generally by the reference numeral 40 and comprising a circle 41 formed of relatively stiff wire of circular cross-section. One end 42 of the member 41 slightly overlaps an intermediate portion 43 to complete the circle; and the overlapping wire portions may preferably be secured together by soldering, welding or the like. Immediately beyond the region of overlap, the wire is bent as at 44 to extend radially outwardly to define a stem or stake 45.

At each of three angularly spaced points on the periphery of the circle, the wire 41 is bent out of the general plane of the circle in one axial direction as at 46 and then out of the general plane of the circle in the opposite axial direction as at 47 to provide an increase in the effective axial thickness of the ring at each of such points. As shown, one of those points is diametrically opposite the stake 45, while the other two of those points are equiangularly spaced oppositely about the circle from that one point.

At said one point, a resilient clip 50 is secured to the ring 41 as, for instance, by welding or soldering. The clip 50 comprises a length of spring wire secured at its midpoint 51 to the external periphery of the ring, and having one leg 52 projecting away from the general plane of the ring in one axial direction and an equal leg 53 projecting away from the general plane of the ring in the opposite axial direction. The clip 50 is disposed outside the external periphery of the ring, and the legs 52 and 53 are disposed generally in a common plane tangent to the ring at the point of attachment of the clip to the ring. Preferably, the legs 52 and 53 are rebent, as shown, to improve their frictional and resilient engagement with the external surfaces of the adjacent ends of the tile between which the spacer is to be located.

Identical clips 50A and 50B are similarly mounted at the other regions of increased effective axial thickness of the ring.

Preferably, the stem 45 may likewise be formed, near its distal end, with portions 48 and 49 oppositely bent out of the general plane of the ring 41.

This form of spacer is used substantially in the manner above-described with respect to the spacer 12. The ring 41 is disposed between the adjacent ends of successive tile, such as 10 and 11, whereby the legs 52 of the clips 50, 50A and 50B will resiliently engage the external surface of the tile 10 at angularly spaced points, and the legs 53 of the three clips will resiliently engage the external surface of the tile 11, whereby the ring 41 will be held against transaxial movement relative to either tile. The regions of increased effective axial thickness of the ring will space the adjacent tile ends from each other sufficiently to provide clearance, like the clearance 32,

throughout the peripheral region between the tilings. The stem 45 may be driven into the bottom of the ditch to a desired extent in order to support the associated tile ends at a desired level above the bottom of the ditch. If, in some instances, it is found that the presence of the stem might be undesirable, it can be readily broken away at the weakened region shown at 54 in Fig. 5.

In Fig. 7 we have indicated a further modified form which our spacer may take. According to this embodiment, a ring, generally similar to the ring 41, but without the bent portions 46 and 47, may be formed of wire, as indicated fragmentarily at 60. At each of several angularly-spaced points about the periphery of the ring, a clip, indicated generally by the reference numeral 61, will be mounted upon the ring. At its midpoint, the clip 61 is bent to a U-shape, as at 62, to provide parallel portions 63 and 64 closely embracing the opposite axially-facing surfaces of the ring, and defining regions of increased effective axial thickness of the spacer. Preferably, each clip will be secured to the ring as, for instance, by soldering or welding.

At the upper ends of the sections 63 and 64, the clip portions are bent to provide a leg 65 projecting axially away from the general plane of the ring 60 in one direction and a leg 66 projecting axially away from that plane in the opposite direction. In this form of clip, we have shown the distal ends of the legs 65 and 66 inclined slightly outwardly from the common plane of the proximal portions of said legs to facilitate frictional engagement of said legs with tile ends between which the spacer is to be located. In this form, as in those previously described, the clip 61 will be formed of spring wire; and the legs 65 and 66 are, as clearly illustrated, disposed outwardly beyond the external periphery of the ring 60. The spacer of Fig. 7 will cooperate with the tile ends 10 and 11 substantially in the manner described in the discussion of Figs. 1 to 6.

In Fig. 8, we have shown a fragment of a ring 70 similar to the ring 41 and similarly formed of wire with similar portions 71 and 72 bent oppositely axially out of the general plane of the ring. At each of several angularly-spaced points, a clip 73 has its midpoint 74 fixedly secured to the ring 70 in a region of increased effective axial thickness. Each clip 73 has oppositely projecting legs 75 and 76 similar to the legs 52 and 53 of Fig. 6. Because each clip 73 is fixed to the ring at a point of increased effective axial thickness, such clip 73 is relatively readily rocked about an axis tangent to the ring 70, whereby the spacer may more readily be used between a tile 10 and another tile 11' of somewhat larger diameter.

In Fig. 9 we have shown a further form of spacer comprising a wire ring 80 with which, at each of several angularly-spaced points, there are associated two spring clips indicated generally at 81 and 82, respectively. The clip 81 is generally U-shaped, providing a base 83 which is suitably secured, as by soldering or welding, at its midpoint to the surface of the wire ring 80 which is presented in one axial direction; and the space legs 84 and 85 of the clip 81 extend back over the wire 80 and project axially in the opposite direction from the general plane of the ring. The clip is formed of spring wire, and the distal ends of its legs 84 and 85 are spaced apart a distance slightly greater than the wall thickness of the tile 10 with which the clip is to be associated, while intermediate portions of the legs are so formed as to be spaced apart a distance less than that wall thickness, when the clip is in equilibrium condition. Thus, when the several clips 81 associated with the ring 80 are engaged with the end of the tile 10, the legs 84 and 85 of each clip are cammed apart so that, when the parts are in the illustrated positions, the legs 84 and 85 resiliently grip the outer and inner surfaces, respectively, of the tiling.

Each clip 82 is similarly generally U-shaped and has its base 86 secured, substantially at its midpoint, to that

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face of the ring 80 diametrically opposed to the surface to which the clip base 83 is secured. The legs 87 and 88 of the clip 82 extend back over the ring and project axially in the direction opposite the direction of projection of the legs 84 and 85. The legs 87 and 88 are similarly designed so that, when the clip 82 is engaged with the tile end 11, the legs 87 and 88 are cammed apart from their equilibrium position so that they resiliently grip the outer and inner surfaces of the tile end.

In Figs. 10 and 11, we have shown a different form of means for increasing the effective axial thickness of a wire ring, indicated at 90, at spaced points in the peripheral extent of the ring. By a stamping operation, a portion of the body of the wire 90 may be deformed, as at 91, to protrude beyond one axially-facing surface of a ring formed from the wire. Obviously, such deformations may be formed on opposite surfaces of the wire, either at coordinate points or at angularly spaced points from the illustrated deformation 91.

It will be clear that any one of the several forms of spacers illustrated and described herein may be engaged between adjacent ends of successive tile in a run of the character above-described, and will act to hold successive tile in substantial axial alignment and with adjacent ends of successive tile spaced axially from each other to a predetermined degree. It will also be clear that any one of the several forms of spacers will be extremely inexpensive to manufacture, easy to handle in the field, and readily associable with tile to be aligned and spaced.

The expression "an arcuate member" is used herein to include completely-circular, as well as part-circular, elements.

We claim as our invention:

1. An aligning spacer comprising an arcuate member formed of flat wire and having a radial dimension greater than its axial dimension and presenting its flat faces axially of said member, said member having a peripheral extent greater than 180° but less than 360°, a clip having its midportion embracing the flat faces and the inner peripheral surface of said member substantially at the midpoint of the peripheral length of said member and having its opposite, resilient end portions disposed radially outward beyond the outer peripheral surface of said member and projecting axially oppositely from said member, and two further similar clips similarly mounted on

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said member at oppositely spaced points more than 90° removed from said first-named clip.

2. An aligning spacer comprising a single length of wire formed to define a circle and a stem projecting substantially radially outwardly from one point on said circle, said wire, at at least three points substantially equiangularly spaced on such circle, being oppositely offset out of the general plane of the circle, and a length of spring wire secured to the external periphery of said single length at each of said points and extending oppositely axially from said plane.

3. The spacer of claim 2 in which said stem is structurally weakened at a point near the periphery of such circle to facilitate fracture thereof at such point.

4. An aligning spacer comprising a single length of wire formed to define a circle, said wire, at at least three points substantially equiangularly spaced on such circle, being provided with protrusions out of the general plane of the circle, and a length of spring wire secured to said single length at each of said points and having opposite terminal portions disposed outside the periphery of the circle and extending axially from said plane.

5. The combination with a pair of adjacent, aligned, open-ended drain tile sections, of an aligning spacer comprising an arcuate member formed on a diameter intermediate the outside and inside diameters of said tile sections, said member having a radial dimension at least equal to its axial dimension and substantially less than the wall thickness of said tile sections, clip means surrounding the axial surfaces and the inner peripheral surface of said member at a plurality of spaced points, each clip means including oppositely-axially-projecting portions disposed radially outwardly beyond the outer periphery of said member and frictionally engaging the external surfaces of said tile sections, respectively, and means associated with each of said clip means to increase the effective axial dimension of said member at each of said points.

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