

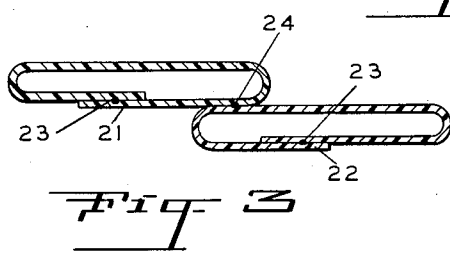
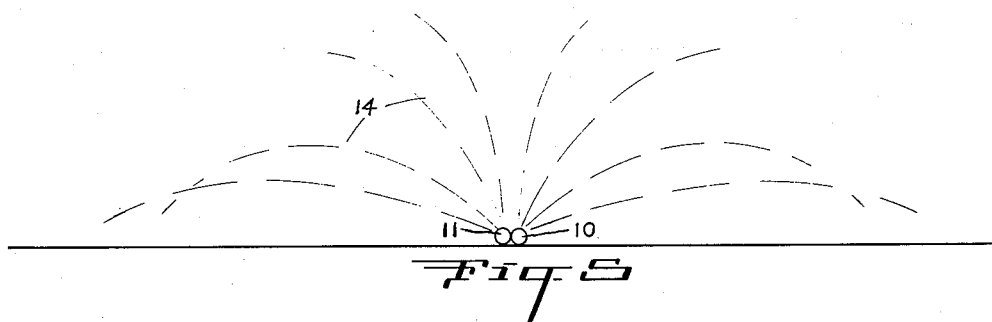
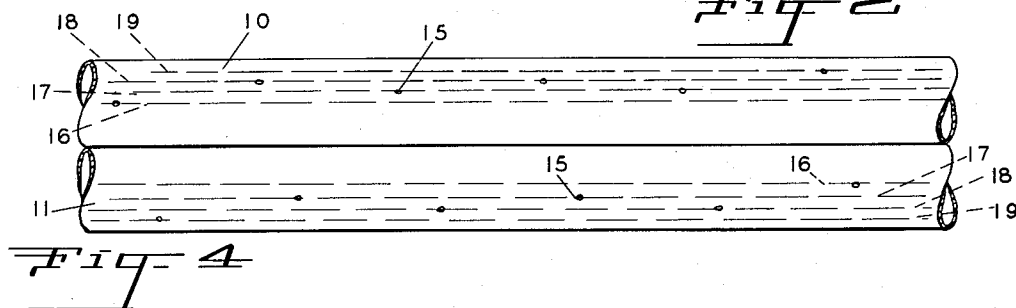
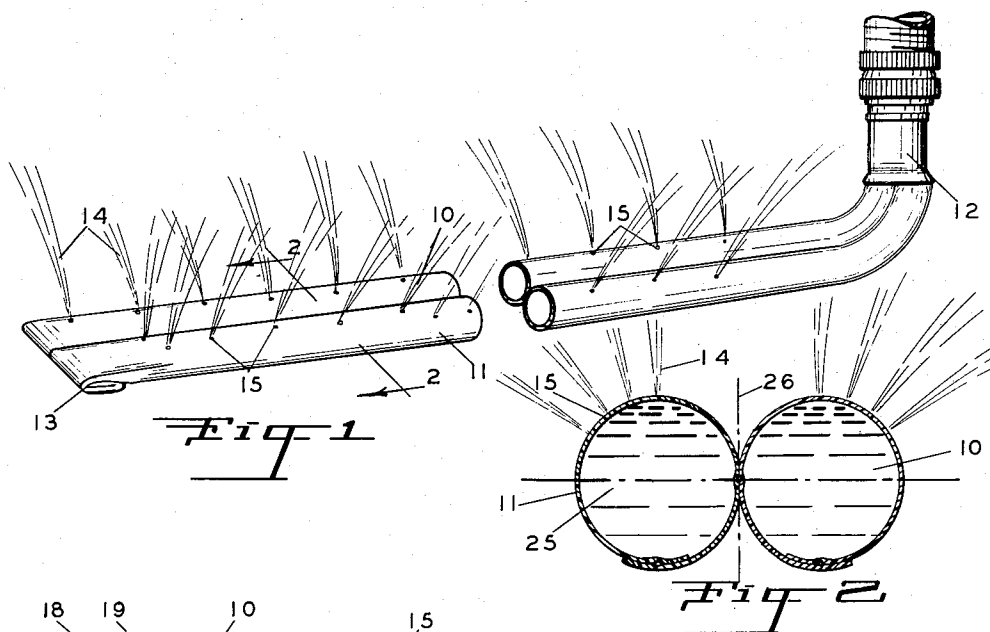
June 5, 1956

A. M. ANDREWS
SPRINKLING DEVICE

2,749,180

Filed Oct. 31, 1952

3 Sheets-Sheet 1



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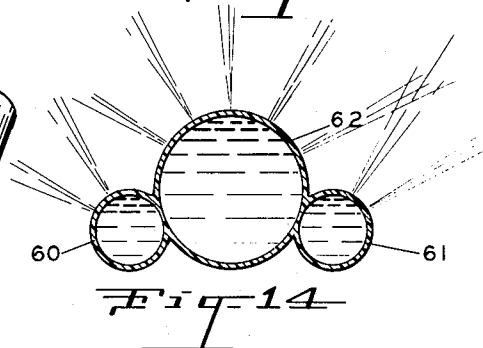
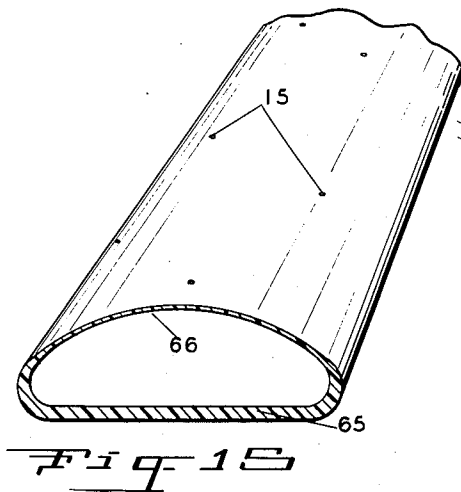
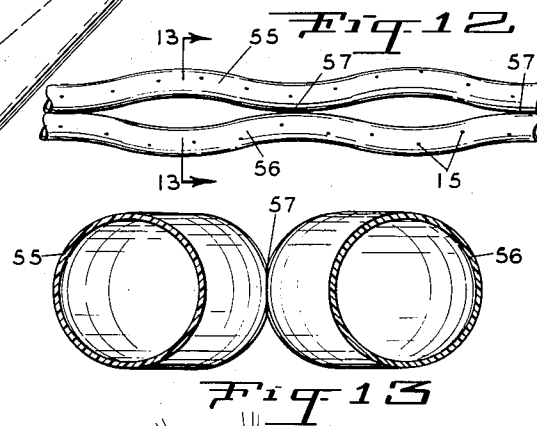
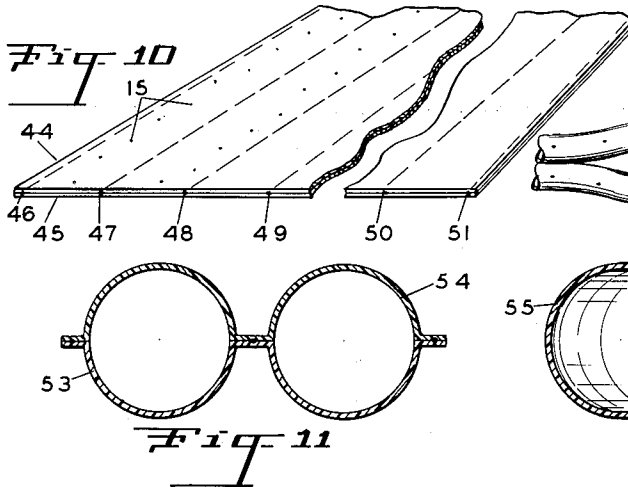
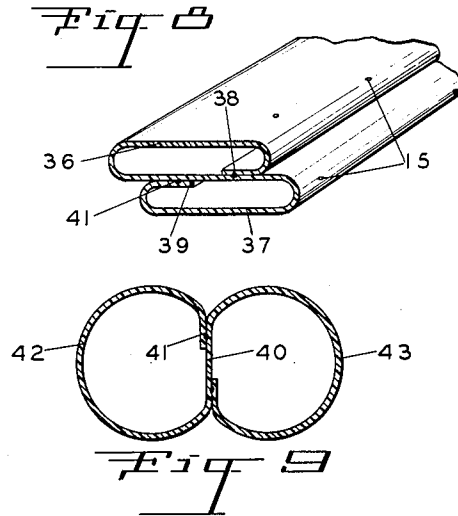
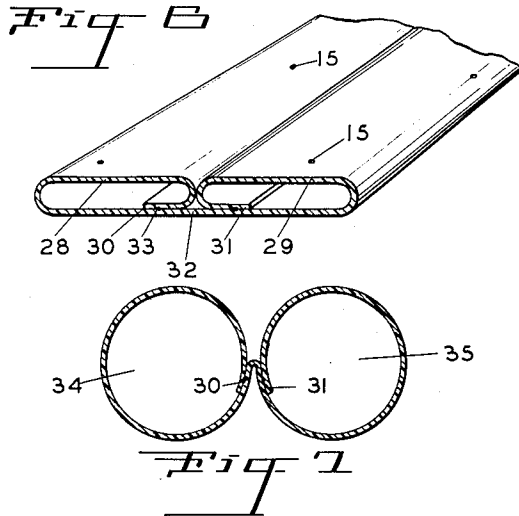
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2,749,180

Filed Oct. 31, 1952

3 Sheets-Sheet 2



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2,749,180

Filed Oct. 31, 1952

3 Sheets-Sheet 3

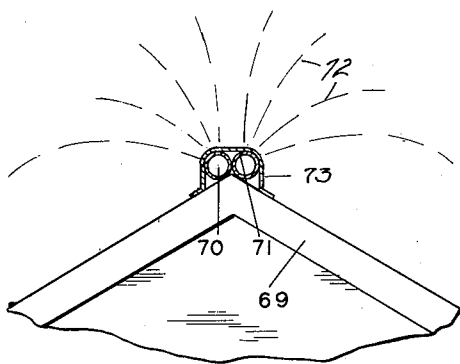


Fig 16

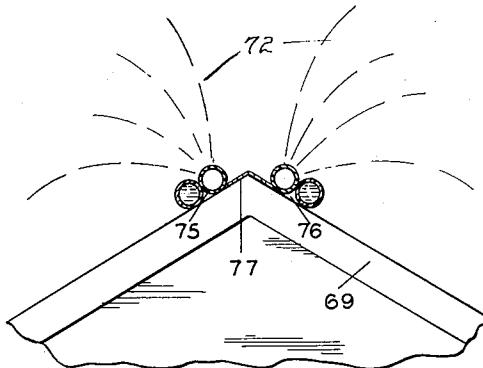


Fig 17

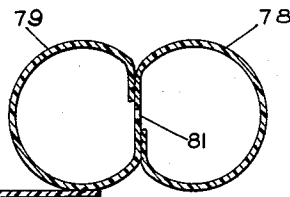
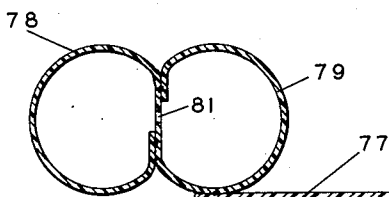


Fig 18

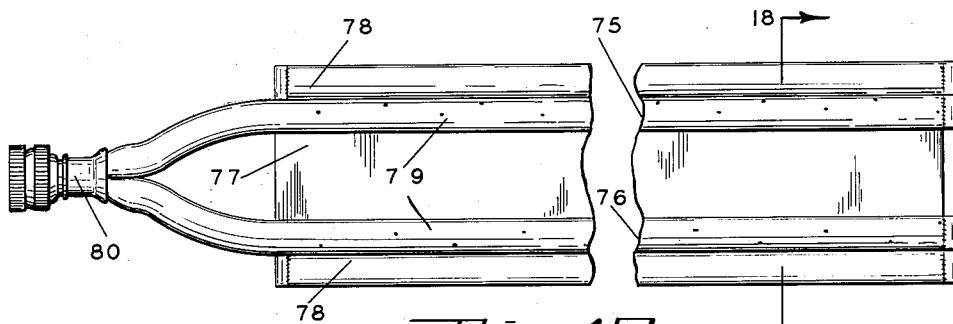


Fig 19

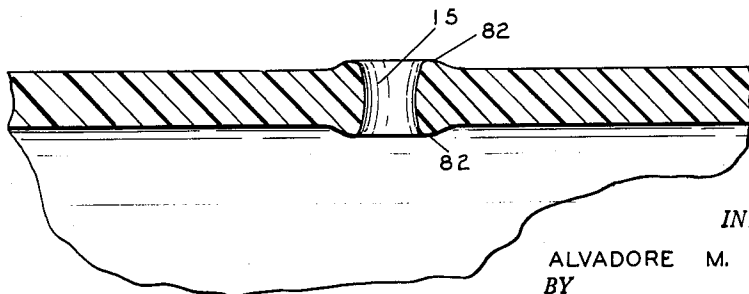


Fig 20

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2,749,180

SPRINKLING DEVICE

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Application October 31, 1952, Serial No. 318,065

4 Claims. (Cl. 299—104)

The present invention relates to lawn sprinkling devices. The present application is a continuation-in-part of my copending application Serial No. 292,148, filed June 6, 1952, and entitled Sprinkler and Coupler Therefor (now abandoned).

The most common forms of lawn sprinkler now in general use are of a mechanical type and which distribute water over a circular pattern. Most lawns, however, are not of circular shape but are generally of rectangular configuration so that difficulty is encountered in obtaining uniform coverage of the lawn area without an excessive waste of water. Again, many lawn areas are relatively long and narrow, such as parking strips, and which areas are exceedingly difficult to water with the conventional circular pattern sprinklers. For sprinkling narrow strips of lawn, iron pipe arrangements have been devised having a series of spaced-apart spray heads extending along one side of the pipe and with base elements attached to the pipe for supporting it in the desired, upright condition. Such spray pipes, however, are not readily adjustable as to length depending upon the needs, and are difficult to handle and to store.

Hoses have been provided heretofore having a series of spray heads spaced along the length thereof, each spray head sprinkling water over a circular pattern but such sprinkler hose arrangements are relatively expensive, cumbersome and frequently are unsuitable for universal usage.

A further common form of lawn watering device consists of an elongated conduit formed of canvas and frequently referred to as a soaker. Such a soaker is not a sprinkling device but permits seepage of water through the pores of the fabric throughout the entire length thereof. While such a soaker is particularly suitable for use around shrubbery where wetting of the foliage is not desired, it is quite impractical for use in watering a large lawn area due to the restricted coverage.

It is a general object of the present invention, therefore, to provide a new and improved irrigating device having almost universal applicability in that it is suitable for irrigating areas of virtually any shape, rectangular or irregular. It is especially suitable for irrigating long, narrow strips of lawn with a substantially even distribution of water. Moreover, the device of the present invention may be used equally well as a soaker in and around shrubbery when desired. Furthermore, the irrigating device of the present invention is extremely light in weight, easy to handle and store, simple in design and construction, and has a low manufacturing cost.

Other objects and advantages of the invention will become apparent hereinafter.

In accordance with an illustrated embodiment, the sprinkling device of the present invention comprises an elongate conduit means or hose having a plurality of small, longitudinally spaced-apart apertures therethrough to permit the escape of fine streams of water. The configuration of the hose is such that it has at least one broad surface upon which it rests when stretched upon the

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ground, the apertures being confined to the opposite side of the hose whereby water will be sprayed upwardly and laterally of the hose.

For a more detailed description of the invention, reference is made to the following specification taken in conjunction with the accompanying drawings wherein:

Fig. 1 is a perspective view of a lawn sprinkler in accordance with the present invention;

Fig. 2 is an enlarged cross-sectional view taken along the line 2—2 of Fig. 1 and showing a hose formed in accordance with one embodiment of the invention;

Fig. 3 is a view illustrating a mode of manufacturing the hose shown in Fig. 2;

Fig. 4 is an enlarged top plan view of a section of the hose shown in Fig. 1;

Fig. 5 is a cross-sectional diagrammatic view illustrating how water is sprayed from the hose of Fig. 1;

Fig. 6 is a fragmentary perspective view showing a manner of forming a modified hose from a single piece of plastic sheet;

Fig. 7 is a cross-sectional view of the hose of Fig. 6 showing it in its expanded operative configuration;

Fig. 8 is a fragmentary perspective view showing a manner of making a hose in accordance with a further modification of the invention;

Fig. 9 is a cross-sectional view of the hose of Fig. 8 illustrating its expanded configuration;

Fig. 10 is a perspective view illustrating another convenient and inexpensive manner of making sprinkler hoses;

Fig. 11 is an enlarged cross-sectional view showing the expanded configuration of a hose made in the manner illustrated in Fig. 10;

Fig. 12 is a top plan view of a manner of arranging a pair of individual tubes to form an orientable hose in accordance with the invention;

Fig. 13 is an enlarged cross-sectional view taken along line 13—13 of Fig. 12;

Fig. 14 is a cross-sectional view showing a modified arrangement of tubes to form an orientable hose;

Fig. 15 is a perspective view showing a section of a single tube adapted to be oriented in accordance with the invention;

Fig. 16 is a view showing a hose formed of a pair of parallel elongate tubes mounted on the ridge of the roof of a building so as to spray the opposite sides of the roof;

Fig. 17 is a view showing another arrangement for mounting hoses along the ridge of a roof;

Fig. 18 is an enlarged cross-sectional view taken along line 18—18 of Fig. 19;

Fig. 19 is a top plan view of an arrangement of hoses suitable for mounting as shown in Fig. 17; and

Fig. 20 is an enlarged cross-sectional view through the wall of a tube formed of plastic sheet and showing the preferred configuration of the sprinkler openings therein.

It will be obvious from a perusal of the present specification that the hoses of the invention may be made in a wide variety of forms and types. Because of the minimum consumption of materials involved and low cost it has been found expedient to form the hoses of the invention from relatively thin plastic sheet, sheets of vinyl chloride-acetate having been found to be particularly suitable. Sheets of various thickness may be used, though a thickness of from about 8 to 12 thousandths of an inch is desirable to provide a hose having sufficient strength to withstand normal handling and the abrasive wear occurring during the usage of the hose. To more clearly illustrate the invention, the thickness of the sheet is shown in the drawings in exaggerated proportion.

Referring now to the drawings, it will be seen that the sprinkling hose of the invention comprises in general

an elongate conduit means formed of thin, flexible water impervious material. Such hoses as manufactured and packaged for sale are collapsed flatwise as indicated in Figs. 3, 6 and 8, the opposite side walls being shown slightly separated in those views, however, to more clearly show certain details of the hoses. However, the hoses are expandable when filled with water to a cross-sectional configuration having a substantially horizontal major axis and a substantially vertical minor axis and presenting at least one broad surface upon which the hose may be placed to orient it in position over a supporting surface. Referring now more particularly to Figs. 1 and 2, a sprinkler is illustrated comprising a pair of elongated tubes or conduits 10, 11 secured together in longitudinally parallel relation. It will be observed from reference to Fig. 2 that the sprinkler has a major horizontal dimension or axis indicated by the dotted line 25 and a minor vertical dimension or axis indicated by the dotted line 26. The tubes are connected at one end to a coupling device 12 by means of which the tubes may be coupled to a single water faucet or the like. A suitable coupling device for use with hoses formed of thin, flexible material is that illustrated in my application Serial No. 292,148, filed June 6, 1952. The opposite ends 13 of the tubes are sealed closed in any suitable manner. Each of the tubes 10, 11 is provided with a plurality of longitudinally spaced-apart apertures or openings 15 through which fine streams of water 14 are ejected from the tubes. Preferably the openings 15 are formed in a plurality of laterally spaced-apart, longitudinally extending rows indicated by the dotted lines 16, 17, 18 and 19 in Fig. 4, and over corresponding minor circumferential portions of the surface of the tubes 10, 11 displaced between approximately 90 degrees and 180 degrees from the united portion of a tube, whereby water will be sprayed in a substantially evenly distributed pattern on each of the opposite sides of the hose as shown in Fig. 5. As most clearly seen in Fig. 4, one row 16 of the openings is arranged substantially along the uppermost portion of the tube while the other rows 17, 18 and 19 are each spaced successively angularly apart to the side of a tube away from the other tube whereby water sprayed from the openings of row 16 will fall upon the area immediately adjacent to the hose, and the water sprayed from the rows 17, 18, 19 will fall upon areas lying progressively more distant from the hose as indicated in Fig. 5. The openings 15 are preferably of a small diameter of about, for example, 0.007 inch whereby the streams ejected from the openings will cover a wide area as indicated in Fig. 5. Obviously, the exact spacing of the openings will depend upon the diameter of the tubes making up the hose and the size of the openings 15 as well.

The hoses of the invention may be made and secured together by any suitable method but they may be conveniently manufactured by the method of my Patent No. 2,500,053, issued March 7, 1950. In accordance with that method the tubes illustrated in Figs. 2 and 3 are formed by overlapping the edge portions 21, 22 of the longer sides of an elongated, rectangular sheet of plastic with a thread 23 impregnated with a bond-effecting liquid disposed between the overlapped edges. Preferably the sheet from which the tube is formed is previously perforated as by the method and apparatus of my copending application, Serial No. 316,037, filed October 21, 1952, now Patent No. 2,683,208, issued July 6, 1954. After the overlapping step, the edge portions 21, 22 are pressed together to express the solvent from the thread 23 so as to effect a bond between the adjacent, overlapped surface portions of the sheet. In like manner a pair of tubes may be jointed together by placing a thread 24 impregnated with bond-effecting liquid between a pair of tubes overlapped in the manner indicated in Fig. 3 and thereafter applying pressure to the overlapped portions to express the liquid from the thread and to bond the tubes to one another.

A convenient manner of making a dual tube hose from a single sheet of plastic is shown in Fig. 6. In this instance the opposite side portions 28, 29 of a rectangular sheet of plastic are overfolded upon the same surface of the sheet with the opposite marginal edge portions 30, 31 of the sheet folded between the corresponding side portions 28, 29 and the central portion 32 of the sheet. The adjacent surfaces of the marginal edge portions 30, 31 are bonded to the central portion 32 of the sheet relatively closely adjacent to longitudinal center line of the sheet, the bonding being effected in any suitable manner, such as, for example, by placing a solvent impregnated thread 33 between each of the marginal edge portions and adjacent surface of the sheet and applying pressure to express the solvent from the thread. The expanded configuration of the hose is shown in Fig. 7 in which it may be seen that a pair of fluid conduits 34, 35 of substantially equal diameter are provided connected together by the narrow segment of the sheet extending along the center thereof between the areas along which the marginal edge portions 30, 31 are bonded. It will be noted that the expansive forces of water in the hose will be applied in shear to the bonded surfaces rather than in tension, which is desirable, of course, since the bonded joints will have much greater strength in shear. Preferably the sheet from which the hose is formed is perforated prior to the forming operation so as to provide suitable openings 15 in each of the conduits 34, 35 for effecting spraying as above described.

Another manner of forming a dual-tube hose from a single sheet of plastic is shown in Fig. 8. In this modification the opposite side portions 36, 37 of an elongate sheet of plastic or other suitable water impervious material is rolled or turned toward the opposite surfaces of the sheet with the opposite marginal edge portions 38, 39 folded inwardly between the side portions 36, 37, respectively, and the unfolded portion of the sheet. The folded side portions 36, 37 are each brought beyond the longitudinal center line of the sheet a substantially equal distance whereby they are in relatively overlapping relation to one another, and the marginal edge portions 38, 39 are each bonded in fluid tight relation to the surface portion of the sheet immediately adjacent thereto. The impregnated thread method of my patent, supra, may be used to effect this bonding, and a thread 41 for carrying the solvent or bonding liquid in accordance with such method is shown between the bonded surface portions. As shown in Fig. 9, the foregoing provides a pair of fluid conduits 42, 43 for which the centermost portion 40 of the sheet serves as a common wall and which wall is substantially vertical when the hose is filled with water and rests upon the ground. Preferably the sheet is perforated before forming the hose to provide sprinkling openings 15 along the conduits 42, 43 in substantially the same relative positions shown in previous figures and more particularly described in reference to Figs. 2, 4 and 5.

A further convenient and inexpensive manner of manufacturing hoses in accordance with the invention is indicated on the view of Fig. 10 which shows a pair of superposed elongate sheets 44, 45 of flexible plastic material which are united together by any suitable method along narrow longitudinally extending seams or portions 46, 47, 48, 49, 50 and 51, spaced apart laterally substantially equal distances. The united sheets may be cut along spaced-apart seams thereof to form united pairs of parallel elongate conduits 53, 54 as illustrated in Fig. 11. Alternatively, the sheets 44, 45 may be cut at other of the seams to form three or more parallel conduits. Prior to sealing the sheets 44, 45 together along the aforesaid portions, one of the sheets, the upper sheet 44 in this instance, may be provided with a plurality of laterally and longitudinally spaced-apart openings 15 in each of the portions thereof which will be subtended by the united portions of the sheet. It will be obvious that the sheet 44 is preferably perforated to provide for an even distribu-

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tion of water sprayed from the hoses formed in accordance with this method.

It will be seen that each of the hoses described above is adapted to rest upon the ground with the individual tubes or conduits thereof in side-by-side relation. Preferably each of the conduit portions making up a particular hose is of substantially the same expanded cross-sectional area whereby the longitudinal axis of each conduit will be spaced a substantially equal distance above the ground when the hose is in operation. As will be apparent from the various views, in each of the hoses described above only one of the circumferential portions thereof subtended by a plane extending along the forementioned longitudinal axes of a hose is provided with a plurality of small spaced-apart openings 15 whereby water will be sprinkled upwardly and outwardly from the hose when it is placed upon the ground in the operative position shown in various figures. On the other hand, if the relative position of the hose is reversed water will be emitted directly upon the ground beneath the hose to provide an effective soaking type of irrigation device.

It will be obvious that it is not absolutely necessary that the conduits forming the hose of the invention be united together throughout their full extent. In Figs. 12 and 13 are shown a pair of conduits 55, 56 which are united together at spaced-apart intervals 57 along their length. Such an arrangement may be particularly desirable when the conduits are formed by an extrusion process, though, of course, individual tubes such as those shown in Figs. 2 and 3 may be joined in this manner. The conduits 55, 56 are provided with openings 15 spaced to assure a fine, even spray of water on each of the opposite sides of the hose.

An orientable structure may also be provided by securing a pair of supporting tubes 60, 61 on each of the opposite sides of a larger principal tube 62 as shown in the cross-sectional view of Fig. 14. Such a structure may conveniently be formed by an extrusion process and is shown as so formed. The principal tube 62 is preferably provided with openings 15 on each of the upper side portions thereof and the supporting tubes 60, 61 are each provided with openings on their outermost upper side portion as shown. As will be evident, in this instance the hose is particularly adapted to sprinkling but will not be as easily arranged for soaking the ground as in the embodiments previously described since the hose will tilt to one side or the other with the result that some water may spray sideways rather than directly upon the ground. On the other hand, this may not be objectionable in many instances.

A further modification of the invention that is primarily designed for sprinkling is illustrated in Fig. 15 wherein a substantially flat circumferential portion 65 of a tube is formed of material of thickness much greater than the remaining portion 66 thereof which thickened portion will resist deformation when water is supplied to the tube and will provide a substantially flat base upon which the tube may be oriented. The longitudinally extending central part of the upper portion 66 of the tube may be provided with suitable openings 15 through each of the opposite sides thereof to accomplish the desired sprinkling.

A unique application of a dual tube hose of the invention is illustrated in Fig. 16 which is an end view of a gable roof 69 showing a hose, such as those of embodiments shown in Figs. 1 to 11, comprising a pair of parallel tubes 70, 71 mounted along the ridge of the roof with one tube on each of the opposite sides thereof, whereby water may be sprinkled uniformly over the opposite sides of the roof as indicated at 72 to cool the roof, and more important, the dwelling. On very sharply peaked roofs the hose may be maintained in position without additional support, but a supporting bracket 73 such as shown may be desired at intervals along the length of the hose to assure maintenance of the hose in proper position espe-

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cially when the ridge is relatively blunt or provided with a rounded cap.

A more stable roof sprinkling device is shown in Figs. 17, 18 and 19 and which device includes two pairs of tubes 75, 76, which tubes may be formed by any of the manners hereinbefore described, the tubes being shown in Fig. 18 as formed in the manner illustrated in Figs. 8 and 9. The pairs of tubes 75, 76 are connected together in laterally spaced-apart, longitudinally parallel relation by suitable web means such as a relatively wide web 77 of plastic sheet or other suitable flexible material whereby the device may be aligned along the ridge of a roof with the web 77 extending along the peak thereof and supporting one of the pairs of tubes 75, 76 on each of the opposite sides of the ridge as shown in Fig. 17. The outermost tube 78 of each pair is not perforated in this instance and is sealed at each of its opposite ends as shown in Fig. 19. The innermost tube 79 of each pair is perforated along its length to spray water upwardly and outwardly of the tube when arranged on a roof as shown in Fig. 17. The innermost tubes 79 are sealed at one end and a suitable coupling device 80 is provided at their opposite ends for connecting the inner most tubes 79 to a water outlet. Communicating means such as the openings 81 (Fig. 18) in the common wall between the outermost tube 78 and the innermost tube 79 are provided so that water may flow into the outermost tube 78. Since there are no outlets in the outermost tubes 78 by which it may escape, this water will remain in such tubes when the device is mounted as shown in Fig. 17 even after the water supply to the innermost tubes 79 is cut off. Since the tubes 78 will remain filled with water, they will act as anchoring means to retain the device in position on the ridge of a roof and prevent it from being blown off of the roof even when it is not in use.

The pressure of the water supplied to the hoses will place the plastic walls thereof under a certain amount of stress. It is important, therefore, that the perforations in the hose be so formed as not to provide a point for a rip or tear to start through the hose since the life of the hose will be materially shortened if such is the case. As pointed out in my copending application, Serial No. 316,037, filed October 21, 1952, it is not desirable to mechanically cut or punch perforations in material such as plastic sheets since the edges of the perforations thereby provided are rough and jagged, and minute rips are formed in the material which extend radially from the edges of the perforation. When stress is applied upon the material these rips tend to creep through the hose and the perforations enlarge excessively when water is supplied to the hose. As a result a greater volume of water is emitted from the portion of the hose adjacent the connected end because of the greater pressure thereat than is emitted from the portion of the hose adjacent the remote end thereof, and the hose may eventually rip completely open if excessive water pressure is accidentally applied thereto. It is preferable, therefore, that the hose be provided with openings or apertures such as are formed by the method described in my copending application, in which method a plastic sheet of high dielectric strength is pierced with a needle or other sharp instrument at each point it is desired to form an opening in the sheet, after which the sheet is passed between a pair of electrodes having a high voltage impressed thereon sufficient to cause an arc discharge between the electrodes. The dielectric strength of the sheet is materially lessened at the points at which it is pierced, permitting an arc discharge to occur through the sheet at these points, the dielectric strength of the sheet preventing arcing therethrough at other points. The heat of the arc through a pierced point causes the surrounding material of the sheet to melt and to fuse with the result that substantially circular openings are formed having a finite cross-section and smooth, continuous edges. Any rips or tears caused by the piercing operation are fused together by the heat of the arc. As the material of the sheet is

melted the cohesiveness and surface tension of the molten material causes it to form meniscus like beads around the periphery of an opening on each of the opposite sides of the sheet and in which beads the material solidifies when the arc discharge is terminated so that integral, annular reinforcing beads are formed about each opening to further strengthen the material and preclude the chance of a rip occurring from the opening. An enlarged cross-sectional view through an opening 15 formed in a sheet of vinyl chloride-acetate sheet by the above described process is shown in Fig. 20. The reinforcing beads are indicated at 82 and it will be seen that the edges of the opening are smooth and continuous.

While it is understood that it is preferred the hose of the invention be made of thin, flexible material so that it may be rolled or folded into a relatively small bundle for storage, the hose may also be formed of heavier material whereby the walls of the individual tubes are of self-supporting material in which case, however, it will be more difficult to align the hose for sprinkling areas of various configuration and to coil it for storage. An additional advantage in using thin, flexible material is that the hose may be shortened to sprinkle small areas merely by folding the hose at some intermediate point or tying a knot therein to confine the water within the shortened length. In any event, it is preferable that the material used in forming the hose have some degree of resiliency whereby the material will stretch to permit enlargement of an opening and the escape of water at a greater rate in response to an increase in the water pressure in the hose.

It will be seen that the present invention provides a sprinkling hose that may be made very inexpensively, that is convenient to handle and to use, and that may be conveniently stored in a very small space when not in use.

While in certain modifications the hoses of the invention comprise parallel cylindrical conduits which will theoretically individually have only a line contact with a supporting surface, it will be apparent that when such conduits rest upon the ground in side-by-side relation they in effect present to the ground a relatively flat broad surface defined by the lines of contact of the individual conduits. It is to be understood, therefore, that the term "flat, broad surface" when used in the following claims is intended to include the above concept.

Having illustrated and described preferred embodiments of the invention, it should be apparent to those skilled in the art that the invention permits of modification in arrangement and detail. I claim as my invention all such modifications as come within the true spirit and scope of the appended claims.

I claim:

1. In the manufacture of a sprinkling hose of the class described, the steps comprising perforating a flat, elongate strip of thin flexible plastic along two narrow longitudinally extending areas of the strip, one spaced on each of the opposite sides of the longitudinal center line of said strip, and thereafter cementing each of the longitudinal

marginal edge portions of the strip to longitudinally extending portions of the strip closely adjacent said longitudinal center line and between said areas to form a pair of parallel fluid conduits each having apertures in the wall thereof for the escape of fluid.

2. The method of manufacturing a sprinkling hose comprising perforating an elongate flat strip of flexible water-impervious plastic to provide a plurality of apertures there-through along a relatively narrow, longitudinally extending portion thereof spaced substantially medially of said strip, and thereafter cementing together in fluid-tight relation the opposite longitudinal marginal edge portions of said strip to form a fluid conducting conduit from which fluid may escape through said apertures.

3. The method of manufacturing a sprinkling hose comprising perforating an elongate flat strip of flexible water-impervious plastic to provide a plurality of apertures there-through, and thereafter folding said strip longitudinally and cementing the same to form an elongate fluid conduit means from which fluid may escape through said apertures.

4. A sprinkling hose comprising a single, elongate, rectangular sheet of thin, limp, flexible plastic material, the opposite longitudinal side portions of said sheet each having a medial part reversely curving inwardly toward the center of the sheet in overlapping relation to the central portion of the sheet, each of said side portions having a marginal edge part reversely curving outwardly away from the center of the sheet and between the corresponding medial part and the central portion of the sheet, each of said marginal edge parts being secured in fluid tight engagement to said central portion along a line closely adjacent the longitudinal center line of the sheet but displaced toward the corresponding side of the sheet to form a pair of elongate fluid conduits, said sheet having a plurality of longitudinally spaced perforations in each of said medial parts.

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