

Description

FIELD OF THE INVENTION

This invention relates to the introduction of elements into a plastic tube during the extrusion thereof and the bonding of these elements to the inner surface of the tube at predetermined locations. The invention relates particularly to a process and an installation for producing a drip irrigation conduit having discrete internally located emitter units bonded at axially spaced apart locations of an internal surface thereof.

BACKGROUND OF THE INVENTION

The enclosing or encasing of cylindrical objects during the course of the extrusion of a plastic sleeve has long been known, e.g. in the production of covered cables or the like. Furthermore it is known to introduce discrete cylindrical objects into a tube during the course of the extrusion thereof. Thus, for example, in U.S. Patent Specification Serial No. 2,484,965 (Slaughter) there is disclosed a method of making extruded collapsible tubes which essentially consists of extruding a continuous tube by means of an extrusion cross head and successively feeding into the extrusion successive spaced-apart tube closures so that the tube is formed around the closures. Similarly, in U.S. Patent Specification Serial No. 2,575,138 (Slaughter) there is disclosed a process for packaging cylindrical articles within a continuous tube comprising the steps of extruding the tube by means of an extrusion cross head, successively feeding the articles to be packaged through the cross head so as to be enclosed by the tube, the portions of the tube between the successive enclosed articles being subsequently sealed and severed.

In both cases the tube is extruded by an angular extrusion nozzle (known as an extrusion cross head) with the cylindrical objects being successively fed into the cross head by means of an appropriate pusher mechanism.

In completely analogous fashion there is disclosed in U.S. Patent Specification No. 3,981,452 the application of this known process in the production of an irrigation conduit in which are located at predetermined intervals, successive cylindrical units which together with the inner face of the conduit form a plurality of emitter units.

In all cases of the prior art referred to above, the element to be enclosed by the extruded tube, whatever its nature, is of cylindrical shape and is wholly enclosed by the extruded tube.

The present invention, on the other hand, relates particularly to the production of a drip irrigation conduit, wherein the internally bonded emitter

units are not of circular cross section extending across the entire periphery of the surrounding conduit, but are of limited depth with the bonded area thereof extending into the conduit for less than half the diameter thereof. Drip irrigation conduits having emitters of this kind are, for example, disclosed in our earlier U.S. Patent No. 4,307,841.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a new method and apparatus for the production by extrusion of drip irrigation conduits having internally heat welded emitter units of this kind.

According to a first aspect of the present invention there is provided a process for producing a drip irrigation conduit having internally heat welded emitter units, each emitter unit including a welded area having a transverse, peripheral extent not greater than half the transverse peripheral extent of the conduit, characterised in the steps of:

continuously extruding an irrigation conduit from an extrusion cross-head at a first outer diameter and a first linear velocity;

passing the extruded conduit through an intermediate zone and into a calibrator unit so as to be drawn down to a second outer diameter which is less than the first outer diameter and so as to have a second linear velocity greater than the first linear velocity;

supporting said emitter units over a support region coaxial with the extruded conduit and extending from a first end of said support region within the extruder cross-head to an opposite end of said support region within the calibrator unit;

displacing each supported emitter unit at a emitter unit linear velocity substantially equal to said second linear velocity into contact with said extruded conduit where the conduit has substantially attained said second linear velocity;

cooling the extruded conduit and internally heat welded emitter units;

successively determining the location of the heat welded emitter units in the conduit; and

aperturing the conduit so as to form respective drip outlets for the emitter units.

According to a second aspect of the present invention there is provided a extrusion installation for use in carrying out this process and characterised in that there is provided:

an extrusion cross-head with an axial bore;

a calibrator unit spaced therefrom by an intermediate region;

drawing-off means located downstream of said calibrator unit for drawing off the extruded conduit through and out of the calibrator unit at a conduit linear velocity;

an emitter carrier element located coaxially

with said axial bore having a first end located within said bore and a second opposite end located within said calibrator unit;

emitter feed means for successively feeding emitter units to said carrier element; and

emitter displacement means for displacing said emitter units along said carrier element at an emitter unit velocity substantially equal to said conduit linear velocity in contact with an extruded conduit when the latter has substantially attained said conduit linear velocity.

By virtue of the process and apparatus in accordance with the invention, it is possible to ensure that the extruded conduit is contacted, whilst still in a semi-molten malleable state, by successive emitter units which are accelerated from rest so as to attain a displacement rate substantially equal to the conduit linear velocity whereupon the emitter units contact the conduit, and are at all times supported until they are fully heat welded to the conduit, thereby ensuring the effective heat welding of the emitter units to the conduit as part of the overall extrusion process without disturbing the extrusion process or overall characteristics of the conduit.

SUMMARY OF THE DRAWINGS

For a better understanding of the present invention and to show how the same may be carried out in practice, reference will now be made to the accompanying drawings in which:

Fig. 1 is a schematic view of a drip irrigation conduit extrusion installation in accordance with the present invention;

Fig. 2 is a longitudinally sectioned view, on an enlarged scale, of a portion of the installation shown in Fig. 1;

Fig. 3 is a cross-sectional view of the installation shown in Fig. 2 taken along the line III-III; and

Figs. 4a, 4b and 4c show cross-sectional views of various modifications of a detail of the installation shown in Figs. 2 and 3.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

As seen in Fig. 1 of the drawings, the installation comprises an extruder 1 provided with an extrusion cross-head 2 having a coaxial bore 3 through which extends an elongated emitter carrier 4. An upstream end 4a of the carrier 4 is juxtaposed with respect to an emitter stack 5 from which emitters 6 can be successively fed on to the upstream end of the carrier 4.

A calibration and cooling unit 8 is located downstream from the extrusion cross-head 2 and is spaced therefrom by an intermediate region 9. A downstream end 4b of the carrier 4 projects into

the unit 8. Downstream of the unit 8 is a plurality of further cooling units 10 followed by a conduit aperturing station 11, caterpillar type drawing off means 12 for drawing off an extruded conduit 13 and a conduit coiling mechanism 14.

An emitter displacement means 16 is located upstream of the upstream end 4a of the carrier 4 and is provided with a pusher 17 aligned with the carrier 4. The displacement means can be, for example, mechanically, electro-mechanically, or hydraulically operated so as to displace the pusher 17 at a rate which is at all times controlled in accordance with operational requirements.

Reference will now be made to Figs. 2 and 3 of the drawings for a more detailed description of the extrusion cross-head 2, the carrier 4 and the calibration and cooling unit 8. The extrusion cross-head 2 comprises a mandrel 21 having an outwardly directed flange 21a screw bolted to a cylindrical sleeve 22 in which is screw fitted a die element 23, there being defined between the die element 23 and the mandrel 21 a spacing from which is extruded the conduit 13.

Spaced from the extrusion cross-head 2 by an intermediate region 9 is the calibrator and cooling unit 8 comprising an apertured calibrator tube 24 formed integrally with the calibrator flange 25 which is secured to the walls of the unit 8, the latter being filled with cooling water under a vacuum.

Extruding through the axial bore 3 of the extrusion cross-head 2, the intermediate region 9 and into an axial bore 26 of the calibrator tube 24 is the elongated carrier 4 which, as seen in Fig. 3 of the drawings, is formed with a pair of elongated ducts 27 which pass along the length of the carrier and serve for the passage of cooling water from an inlet nipple 28.

The carrier 4 is formed with an upper, axially directed rib 29 adapted to fit into a corresponding recess formed in a base of an emitter 6 so as to support and align the latter. The carrier 4 is supported at the upstream end 4a thereof by a support column 30.

In operation, plastic material 31 passes from the extruder 1 into the extrusion cross-head 2 so as to emerge therefrom at a first linear velocity as an extruded, wide diameter, molten conduit 13. Under the traction force exerted by the drawing-off means 12, the conduit 13 passes through the narrower opening of the calibrator tube 24 with its diameter and wall thickness being reduced to substantially their final dimensions and at a second and higher linear velocity. As the extruded conduit 13 passes at this second linear velocity through the calibrator unit 8 and subsequent cooling units 10 it cools down until it reaches its final set state.

At the same time, successive emitters 6 are fed on to the upstream end 4a of the carrier 4 and

are displaced by the pusher 17 along the carrier 4 so as to be accelerated up to a linear velocity substantially corresponding to the second linear velocity of the conduit until the upper surface of each successive emitter 6 contacts a spaced apart, inner surface location of the conduit when the latter is still in a semi-molten state in the region of an inlet to the calibrator unit 8 and when the conduit has substantially reached its second linear velocity. Each emitter 6 thus begins to become heat welded to the inner surface of the conduit whilst being displaced along the carrier at a linear velocity substantially equal to the second linear velocity of the conduit until, by the time the emitter has reached the end of the carrier, it is firmly heat welded to the conduit.

The displacement of the emitters 6 by the pusher 7 can be effected directly or indirectly, in the latter case via one or more intermediate elements or emitters.

It can be seen that at all times the carrier element never contacts the extruded conduit and supports the emitters at surfaces thereof remote from those surfaces of the emitters which are ultimately heat welded to the conduit.

The spacing apart of the emitters 6 within the conduit 13 is determined by time intervals between the successive displacements of the emitters 6 along the carrier 4.

Once the emitters 6 have been firmly heat welded to the conduit 13 and after the latter has emerged from the final cooling unit 9, the location of the emitter units 6 within the conduit 13 are sensed and the conduit 13 then passes the aperturing station 11 where it is apertured in positions corresponding to the emitter outlets. The conduit 13 with the internally heat welded emitters drawn off by the drawing-off mechanism is coiled by the coiling mechanism 14.

Whilst in the embodiment shown in Figs. 2 and 3 of the drawings the carrier 4 is so constructed as to have the emitter units 6 supported thereby and aligned thereon (further embodiments illustrating this being shown in Figs. 4a and 4b of the drawings), the carrier construction can be so designed that emitter units are effectively suspended from and aligned by the carrier.

Furthermore, whilst in the embodiment specifically described above the carrier 4 projects into the calibrator unit 8 so as to ensure that contact between the emitter units and the extruded conduit and the full heat welding thereof take place when the latter has achieved its final substantially constant velocity, the carrier 4 may alternatively extend only to the region of the inlet of the carrier 4. This situation is less ideal with regard to the ultimate quality of the product compared with that described in detail above wherein it is ensured that the heat

welding of the emitters 6 to the conduit 13 does not result in undue stressing of the conduit and does not interfere with the stability of the extrusion process or with the quality of the extruded conduit.

Claims

1. A process for producing a drip irrigation conduit (13) having internally heat welded emitter units (6), each emitter unit (6) including a welded area having a transverse, peripheral extent not greater than half the transverse peripheral extent of the conduit (13), comprising the steps of:

continuously extruding an irrigation conduit (13) from an extrusion crosshead (2) at a first outer diameter and a first linear velocity;

passing the extruded conduit (13) through an intermediate zone (9) and into a calibrator unit (8) so as to be drawn down to a second outer diameter which is less than the first outer diameter and so as to have a second linear velocity greater than the first linear velocity;

supporting said emitter units (6) over a support region coaxial with the extruded conduit (13) and extending from a first end of said support region within the extruder cross-head (2) to an opposite end of said support region within the calibrator unit (8) or in the region of an inlet of the calibrator unit (8);

displacing each supported emitter unit (6) at an emitter unit linear velocity substantially equal to said second linear velocity into contact with said extruded conduit (13) where the conduit has substantially attained said second linear velocity;

cooling the extruded conduit (13) and internally heat welded emitter units (6);

successively determining the location of the heat welded emitter units in the conduit; and

aperturing the conduit (13) so as to form respective drip outlets for the emitter units (6).

2. A process according to claim 1, wherein said supported emitter units (6) are successively accelerated so as to attain an emitter unit linear velocity substantially equal to said second linear velocity and are displaced in contact with the extruded conduit (13) until each emitter unit (6) is heat welded to the conduit at substantially said opposite end.

3. An extrusion installation for producing a drip irrigation conduit (13) in accordance with the process according to claim 1 and comprising:
 - an extrusion cross-head (2) with an axial bore (3);

are displaced by the pusher 17 along the carrier 4 so as to be accelerated up to a linear velocity substantially corresponding to the second linear velocity of the conduit until the upper surface of each successive emitter 6 contacts a spaced apart, inner surface location of the conduit when the latter is still in a semi-molten state in the region of an inlet to the calibrator unit 8 and when the conduit has substantially reached its second linear velocity. Each emitter 6 thus begins to become heat welded to the inner surface of the conduit whilst being displaced along the carrier at a linear velocity substantially equal to the second linear velocity of the conduit until, by the time the emitter has reached the end of the carrier, it is firmly heat welded to the conduit.

The displacement of the emitters 6 by the pusher 7 can be effected directly or indirectly, in the latter case via one or more intermediate elements or emitters.

It can be seen that at all times the carrier element never contacts the extruded conduit and supports the emitters at surfaces thereof remote from those surfaces of the emitters which are ultimately heat welded to the conduit.

The spacing apart of the emitters 6 within the conduit 13 is determined by time intervals between the successive displacements of the emitters 6 along the carrier 4.

Once the emitters 6 have been firmly heat welded to the conduit 13 and after the latter has emerged from the final cooling unit 9, the location of the emitter units 6 within the conduit 13 are sensed and the conduit 13 then passes the aperturing station 11 where it is apertured in positions corresponding to the emitter outlets. The conduit 13 with the internally heat welded emitters drawn off by the drawing-off mechanism is coiled by the coiling mechanism 14.

Whilst in the embodiment shown in Figs. 2 and 3 of the drawings the carrier 4 is so constructed as to have the emitter units 6 supported thereby and aligned thereon (further embodiments illustrating this being shown in Figs. 4a and 4b of the drawings), the carrier construction can be so designed that emitter units are effectively suspended from and aligned by the carrier.

Furthermore, whilst in the embodiment specifically described above the carrier 4 projects into the calibrator unit 8 so as to ensure that contact between the emitter units and the extruded conduit and the full heat welding thereof take place when the latter has achieved its final substantially constant velocity, the carrier 4 may alternatively extend only to the region of the inlet of the carrier 4. This situation is less ideal with regard to the ultimate quality of the product compared with that described in detail above wherein it is ensured that the heat

welding of the emitters 6 to the conduit 13 does not result in undue stressing of the conduit and does not interfere with the stability of the extrusion process or with the quality of the extruded conduit.

Claims

1. A process for producing a drip irrigation conduit (13) having internally heat welded emitter units (6), each emitter unit (6) including a welded area having a transverse, peripheral extent not greater than half the transverse peripheral extent of the conduit (13), comprising the steps of:
 - continuously extruding an irrigation conduit (13) from an extrusion crosshead (2) at a first outer diameter and a first linear velocity;
 - passing the extruded conduit (13) through an intermediate zone (9) and into a calibrator unit (8) so as to be drawn down to a second outer diameter which is less than the first outer diameter and so as to have a second linear velocity greater than the first linear velocity;
 - supporting said emitter units (6) over a support region coaxial with the extruded conduit (13) and extending from a first end of said support region within the extruder cross-head (2) to an opposite end of said support region within the calibrator unit (8) or in the region of an inlet of the calibrator unit (8);
 - displacing each supported emitter unit (6) at an emitter unit linear velocity substantially equal to said second linear velocity into contact with said extruded conduit (13) where the conduit has substantially attained said second linear velocity;
 - cooling the extruded conduit (13) and internally heat welded emitter units (6);
 - successively determining the location of the heat welded emitter units in the conduit; and
 - aperturing the conduit (13) so as to form respective drip outlets for the emitter units (6).
2. A process according to claim 1, wherein said supported emitter units (6) are successively accelerated so as to attain an emitter unit linear velocity substantially equal to said second linear velocity and are displaced in contact with the extruded conduit (13) until each emitter unit (6) is heat welded to the conduit at substantially said opposite end.
3. An extrusion installation for producing a drip irrigation conduit (13) in accordance with the process according to claim 1 and comprising:
 - an extrusion cross-head (2) with an axial bore (3);



a calibrator unit (8) spaced therefrom by an intermediate region (9);

drawing-off means (12) located downstream of said calibrator unit (8) for drawing off the extruded conduit (13) through and out of the calibrator unit (8) at a conduit linear velocity;

an emitter carrier element (4) located coaxially with said axial bore (3) having a first end (4a) located within said bore (3) and a second opposite end (4b) located within said calibrator unit (8) or in the region of an inlet of the calibrator unit (8);

emitter feed means (16) for successively feeding emitter units (6) to said carrier element (4); and

emitter displacement means (17) for displacing said emitter units (6) along said carrier element (4) at an emitter unit velocity substantially equal to said conduit linear velocity in contact with an extruded conduit (13) when the latter has substantially attained said conduit linear velocity.

4. An extrusion installation according to claim 3, wherein said emitter displacement means (17) is designed to successively accelerate said emitter units (6) along said carrier element (4) so as to attain an emitter unit velocity substantially equal to said conduit linear velocity.
5. An extrusion installation according to claim 3 or 4 wherein said emitter displacement means (17) includes a displaceable pusher (17) aligned with said carrier element (4) and adapted to engage an emitter (6) carried by said carrier element.
6. An extrusion installation according to any one of claims 3 to 5, wherein said carrier element (4) is provided with cooling fluid transmission means (27).
7. An extrusion installation according to any one of claims 3 to 6, wherein said carrier element (4) is designed to support said emitter (6).
8. An extrusion installation according to any one of claims 3 to 6, wherein said carrier element (4) is designed to have said emitters (6) suspended therefrom.

Patentansprüche

1. Verfahren zur Herstellung einer Tropf-Bewässerungsleitung (13) mit innenliegend warmverschweißten Ausströmern (6), wobei jeder Ausströmer (6) einen verschweißten Bereich mit

einer äußeren Querausdehnung aufweist, die nicht größer ist als die Hälfte der äußeren Querausdehnung der Leitung (13), gekennzeichnet durch die Schritte:

fortwährendes Extrudieren einer Bewässerungsleitung (13) mit einem ersten äußeren Durchmesser und einer ersten linearen Geschwindigkeit aus einem Querspritzkopf (2);

Führen der extrudierten Leitung (13) durch einen Zwischenraum (9) und in eine Kalibriereinheit (8), um sie auf einen zweiten äußeren Durchmesser zu bringen, der kleiner als der erste äußere Durchmesser ist und um eine bezüglich der ersten linearen Geschwindigkeit größere zweite lineare Geschwindigkeit zu erreichen;

Abstützen der Ausströmer (6) entlang eines koaxial zu der extrudierten Leitung (13) angeordneten Abstützbereiches, der sich von einem ersten Ende im Querspritzkopf (2) des Extruders zu einem entgegengesetzten Ende in der Kalibriereinheit (8) oder im Bereich eines Einlasses der Kalibriereinheit (8) erstreckt;

in Kontakt bringen jedes abgestützten Ausströmers (6) mit einer Lineargeschwindigkeit im wesentlichen gleich der genannten zweiten Lineargeschwindigkeit mit der extrudierten Leitung (13) an der Stelle, an der die Leitung im wesentlichen die zweite Lineargeschwindigkeit erreicht hat;

Kühlen der extrudierten Leitung (13) und der innenliegend warmverschweißten Ausströmer (6);

aufeinanderfolgendes Feststellen der Lage der warmverschweißten Ausströmer in der Leitung; und

Lochen der Leitung (13), um entsprechende Tropfauslässe für die Ausströmer (6) zu bilden.

2. Verfahren nach Anspruch 1, bei dem die genannten abgestützten Ausströmer (6) aufeinanderfolgend beschleunigt werden, um eine Lineargeschwindigkeit der Ausströmer im wesentlichen gleich der genannten zweiten Lineargeschwindigkeit zu erzielen, und in Kontakt mit der extrudierten Leitung (13) gebracht werden, bis jeder Ausströmer (6) mit der Leitung am im wesentlichen entgegengesetzten genannten Ende warmverschweißt ist.
3. Extrudieranlage zur Herstellung einer Bewässerungsleitung (13) gemäß dem Verfahren nach Anspruch 1, mit:
 - einem Querspritzkopf (2) mit einer Axialbohrung (3);
 - einer davon durch einen Zwischenraum (9) beabstandeten Kalibriereinheit (8);



einer stromabwärts der Kalibriereinheit (8) angeordneten Fördereinrichtung (12) zum Fördern der extrudierten Leitung (13) mit einer linearen Leitungs-Geschwindigkeit durch die Kalibriereinheit (8) und aus ihr heraus;

einem koaxial zu der Axialbohrung (3) angeordneten Träger (4) für Ausströmer mit einem ersten innerhalb der Bohrung (3) angeordneten Ende (4a) und einem zweiten entgegengesetzten Ende (4b), das innerhalb der Kalibriereinheit (8) oder im Bereich eines Einlasses der Kalibriereinheit (8) angeordnet ist;

einer Ausströmer-Zuführeinrichtung (16), um aufeinanderfolgend Ausströmer (6) dem Träger (4) zuzuführen; und

einer Vorschubeinrichtung (17) für Ausströmer zum in Kontakt bringen der Ausströmer (6) entlang des Trägers (4) mit einer Geschwindigkeit im wesentlichen gleich der linearen Leitungs-Geschwindigkeit entlang des Trägers (4) mit einer extrudierten Leitung (13), wenn letztere im wesentlichen die genannte lineare Leitungs-Geschwindigkeit erreicht hat.

4. Extrudieranlage nach Anspruch 3, bei der die Vorschubeinrichtung (17) für Ausströmer zum aufeinanderfolgenden Beschleunigen der Ausströmer (6) entlang des Trägers (4) ausgeführt ist, um eine Geschwindigkeit der Ausströmer im wesentlichen gleich der genannten linearen Leitungs-Geschwindigkeit zu erzielen.

5. Extrudieranlage nach Anspruch 3 oder 4, bei der die Vorschubeinrichtung (17) einen verschiebbaren Drücker (17) aufweist, der mit dem Träger (4) ausgerichtet ist und mit einem von dem Träger getragenen Ausströmer (6) in Eingriff bringbar ist.

6. Extrudieranlage nach einem der Ansprüche 3 bis 5, bei der der Träger (4) Kühlflüssigkeitsleitungen (27) aufweist.

7. Extrudieranlage nach einem der Ansprüche 3 bis 6, bei der der Träger (4) so gestaltet ist, daß er die Ausströmer (6) abstützt.

8. Extrudieranlage nach einem der Ansprüche 3 bis 6, bei der der Träger (4) so gestaltet ist, daß die Ausströmer (6) an ihm aufgehängt sind.

Revendications

1. Procédé de fabrication d'une conduite d'irrigation au goutte-à-goutte (13) munie d'unités goutteurs (6) soudées intérieurement à chaud, chaque unité goutteur (6) comprenant une

zone soudée ayant une dimension transversale périphérique non supérieure à la moitié de la dimension transversale périphérique de la conduite (13),

caractérisé par les phases consistant à :

extruder en continu une conduite d'irrigation (13) à l'aide d'une tête d'extrusion d'équerre (2), à un premier diamètre extérieur et à une première vitesse linéaire ;

faire passer la conduite extrudée (13) dans une zone intermédiaire (9) et l'introduire dans une unité de calibrage (8) de manière qu'elle soit étirée à un deuxième diamètre extérieur qui est inférieur au premier diamètre extérieur, et de manière à obtenir une deuxième vitesse linéaire supérieure à la première vitesse linéaire ;

supporter lesdites unités goutteurs (6) sur une région support coaxial à la conduite extrudée (13) et qui s'étend d'une première extrémité de ladite région support située à l'intérieur de la tête d'équerre (2) de l'extrudeuse, jusqu'à l'extrémité opposée de ladite région support qui est située dans l'unité de calibrage (8) ou dans la région de l'entrée de l'unité de calibrage (8) ;

entraîner chaque unité goutteur supporté (6) à une vitesse linéaire d'unités goutteurs sensiblement égale à ladite deuxième vitesse linéaire, pour les mettre en contact avec ladite conduite extrudée (13) à l'endroit où la conduite a atteint sensiblement ladite deuxième vitesse linéaire ;

refroidir la conduite extrudée (13) et les unités goutteurs (6) soudées intérieurement à chaud ; déterminer l'un après l'autre les emplacements des unités goutteurs soudés à chaud dans la conduite ; et

percer la conduite (13) de manière à former les sorties de gouttes respectives pour les unités goutteurs (6).

2. Procédé selon la revendication 1, dans lequel lesdites unités goutteurs (6) supportées sont accélérées l'une après l'autre de manière à atteindre une vitesse linéaire des unités goutteurs sensiblement égale à ladite deuxième vitesse linéaire, et sont entraînées en contact avec la conduite extrudée (13) jusqu'à ce que chaque unité goutteur (6) soit soudée à chaud à la conduite, sensiblement à ladite extrémité opposée.

3. Installation d'extrusion destinée à fabriquer une conduite d'irrigation au goutte-à-goutte (13) conformément au procédé selon la revendication 1, et caractérisée en ce qu'il y est prévu : une tête d'extrusion d'équerre (2) possédant



un alésage axial (3) ;
 une unité de calibrage (8) espacée de cette tête par une région intermédiaire (9) ;
 des moyens de traction (12) placés en aval de ladite unité de calibrage (8) pour tirer la conduite extrudée (13) à travers l'unité de calibrage (8) et pour l'extraire de cette unité à une vitesse linéaire de la conduite ;
 un élément (4) support de goutteurs disposé coaxialement audit alésage axial (3) et ayant une première extrémité (4a) située à l'intérieur dudit alésage (3) et une deuxième extrémité opposée (4b) située dans ladite unité de calibrage (8) ou dans la région de l'entrée de l'unité de calibrage (8) ;
 des moyens (16) d'acheminement des goutteurs servant à acheminer l'une après l'autre des unités goutteurs (6) audit élément support (4) ; et
 des moyens (17) d'entraînement des goutteurs servant à entraîner lesdites unités goutteurs (6) le long dudit élément support (4), à une vitesse des unités goutteurs sensiblement égale à ladite vitesse linéaire de la conduite, en contact avec une conduite extrudée (13) lorsque cette dernière a sensiblement atteint ladite vitesse linéaire de la conduite.

que lesdits goutteurs (6) soient suspendus à cet élément.

4. Installation d'extrusion selon la revendication 3, dans laquelle lesdits moyens d'entraînement (17) des goutteurs sont conçus pour accélérer l'une après l'autre lesdites unités goutteurs (6) le long dudit élément support (4) de manière à atteindre une vitesse des unités goutteurs sensiblement égale à ladite deuxième vitesse linéaire de la conduite.
5. Installation d'extrusion selon la revendication 3 ou 4, dans laquelle lesdits moyens (17) d'entraînement des goutteurs comprennent un poussoir mobile (17) aligné sur ledit élément support (4) et adapté pour attaquer un goutteur (6) porté par ledit élément support.
6. Installation d'extrusion selon une quelconque des revendications 3 à 5, caractérisée en ce que ledit élément support (4) est équipé de moyens (27) de transmission de fluide de refroidissement.
7. Installation d'extrusion selon une quelconque des revendications 3 à 6, caractérisée en ce que ledit élément support (4) est conçu pour supporter ledit goutteur (6).
8. Installation d'extrusion selon une quelconque des revendications 3 à 6, caractérisée en ce que ledit élément support (4) est conçu pour

