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Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number:

0 101 134
A1

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 83201172.0

(51) Int. Cl.³: **B 65 H 54/58**
B 65 H 75/24

(22) Date of filing: 09.08.83

(30) Priority: 12.08.82 NL 8203175

(43) Date of publication of application:
22.02.84 Bulletin 84/8

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

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(54) A reel for coiling a plastic tube and a method of coiling a plastic tube on such a reel.

(57) A reel (1) for coiling a plastic tube (23) of a highly crystallizable plastic the reel core of the reel comprises fixed reel core strips (4) and radially movable reel core strips (7) therebetween. The radially movable reel core strips are supported by a radially movable support arm 8 cooperating pivotally with a securing arm (9). The securing arm is connected to a fixed frame (10) through a pivot (11) and a cam (13) engages the securing (9) and a slide valve (14) connected to a hydraulic cylinder (16). The pressure fluid in the hydraulic cylinder (16) allows a gradual inward movement of the movable strips (7) during shrinkage of a tube on this core. In a method of coiling a plastic tube (23) of a highly crystallizable plastic, the tube is coiled at a temperature over 90°C on the reel of the invention and during cooling shrinkage is absorbed by the gradually inwardly movable strips (7).

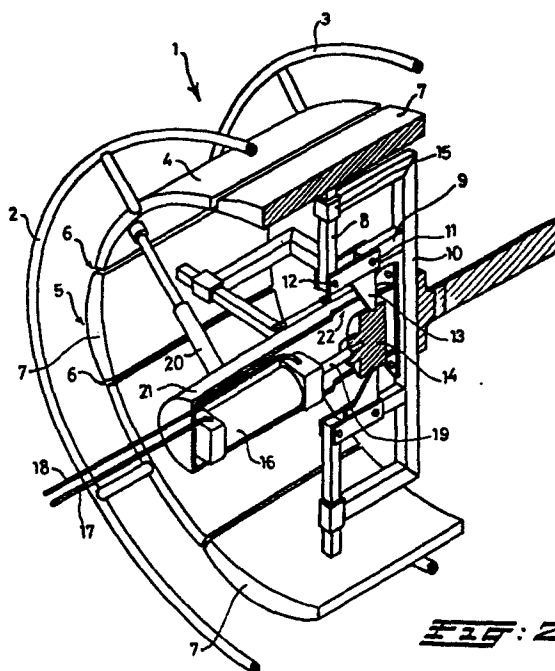


FIG. 2.

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A reel for coiling a plastic tube and a method of
coiling a plastic tube on such a reel.

The present invention relates to a reel for coiling a plastic tube and a method of coiling a plastic tube at least comprising a reel core on such a reel.

5 A reel of this kind for coiling flexible plastic tubing is known in the art.

These known reels are satisfactory for coiling a plastic tube which is not subjected to substantial shrinkage forces occurring after coiling and during storage, e.g., a tube made of polyethylene, polypropylene and similar plastics, and also corrugated tubes.

10

However, for transport of heated fluids, e.g., heating fluids for district heating, plastic tubes have to be used which are made from a plastic being subjected to a considerable recrystallization, e.g., polybutylene.

15 After having coiled tubes of this kind made from a high-recrystallizable plastic, the highly recrystallizable plastic recrystallizes in a first period, e.g., during the first seven days after coiling, considerably shrinkage forces occurring under these conditions so that due to

20 the shrinkage the recrystallized tube presents irregular

properties particularly a flattened, not round shape.

It is an object of the present invention to provide a reel for coiling such plastic tubes made from a high-recrystallizable plastic.

5 To this end, according to the invention, the reel core comprises fixed reel core strips disposed in spaced relationship along the periphery, together with at least one radially movable reel core strip disposed therebetween.

10 With the use of the combination of fixed reel core strips and one or more radially movable reel core strips the plastic tube is coiled in the normal manner to form a coil on a reel so that on cooling and recrystallization the coil fits firmly against the reel core surface.

15 To remove the recrystallized plastic tube from the reel core a radially movable reel core strip can be moved radially inward whereupon the coil of plastic tubing can readily be pushed off the fixed reel coil strips.

20 A reel according to the invention must not be confused with known reels in which all the core surface strips can be radially moved, because the coil of a plastic tube made from high-recrystallization plastic must be kept substantially in its coiled state on the reel after
25 the radially movable reel core strips have been moved radially inward.

Very advantageously, a radially movable reel core strip is supported by a radially movable support preferably

cooperating with a hydraulic actuator.

In a preferred embodiment the movable strip is supported by a pressure fluid allowing a gradual inward movement of the movable strips during shrinkage
5 of a plastic tube coiled on the core.

The invention also relates to a reel according to the present invention with coiled plastic tube, said plastic tube being made of a plastic undergoing considerable recrystallization, more particularly
10 polybutylene.

Finally, the invention relates to a method of coiling a plastic tube on a reel which at least comprises a reel core, characterized in that a highly recrystallizable plastic tube is coiled on a reel according to the
15 invention.

In a preferred embodiment the radially movable reel core strips are supported by a pressure fluid allowing a gradual inward movement of the strips during shrinkage of the coiled tube.

20 In this way a very good coil is obtained from a tube consisting of a plastic which undergoes considerable recrystallization.

Preferably polybutylene is coiled at a temperature above 90°C.

25 The invention will now be illustrated by means of an embodiment as shown in the drawings, wherein:
Fig. 1 is a diagram showing a reel according to the

invention in two parts;

Fig. 2 is a partial section of part of a reel of this kind and

Fig. 3 shows a front view of a reel of the invention
5 with a polybutylene pipe coiled on this reel.

Fig. 1 shows a reel 1 comprising flanges 2 and 3 interconnected by fixed reel core strips 4 disposed radially opposite each other. Four such fixed reel core strips are provided in the exemplified embodiment.

10 A space 5 in the form of a slot exists between two adjacent fixed reel core strips 4 and is defined by the side edges 6 of the fixed strips.

Radially movable reel core strips 7 are disposed in the slot 5 and their shape is adapted to that of the
15 curved fixed reel core strips 4 so that a substantially cylindrical reel core surface is formed when the reel core strips 7 are moved radially outward.

Each radially movable reel core strip 7 is supported by a radially movable support arm 8 being guided in a
20 recess 15 in a frame 10 and being pivotally connected to a securing arm 9. The latter is pivotally connected to the frame 10 through a pivot 11 while a pivotal connection 12 is also provided between the support arm 8 and the securing arm 9. Arm 9 is also connected to
25 a cam 13 which cooperates with a movable piston of a hydraulic cylinder 16. The hydraulic cylinder with a gaseous pressure fluid via a supply line 17, and fluid can be discharged via discharge line 18.

The fixed reel core strips are supported by a fixed

arm 20 connected to a hollow spindle 21 containing the hydraulic cylinder 16. The spindle is formed with slots 22 to enable the cams 13 to be moved.

5 When the piston 14 is moved to the right (with reference to the drawing) the support arm 8 will move radially inward so that the slot 5 between two consecutive reel core strips 4 is freed. As a result a coiled plastic tube can bear against the fixed reel core strips 4 without tension.

10 The reel illustrated can advantageously be used for coiling thereon a polybutylene tube 23 at a temperature of more than 90°C (vide fig. 3). During storage for seven days the plastic in the form of the polybutylene will recrystallize so that considerable
15 shrinkage forces will be exerted on the reel core surface made up of the fixed reel core strips 4 and the radially movable reel core strips 7.

The radially movable reel core strips 7 are then moved radially inward as far as possible whereupon
20 the plastic tube can readily be moved off the reel after removal of one of the reel flanges e.g., 2.

The position of the inwardly retracted reel core strips is shown in fig. 3 by the elements 7a in dotted lines.

25 Another important advantage is that shrinkage forces occurring during recrystallization can also be absorbed in the coil of plastic tubing as the reel core strips 7 are able to move radially inwardly so that the plastic tube retains the optimum desired round shape without

flattening.

- 5 To this end, by applying a desired pressure to the hydraulic cylinder 16, a predetermined limited inward movement with respect to the fixed reel strips can already be imparted to the radially movable reel core strips 7 during recrystallization. Care must, however, be taken to ensure that the movable reel core strips can ultimately be moved inward still more, with a decrease of the effective periphery of the reel, to enable the coil to be readily removed from the reel.
- 10 It is observed that the reference numerals in the claims are not intended to restrict the scope thereof, but are only denoted for clarification.

Claims:

1. A reel (1) for coiling a plastic tube (23) at least comprising a reel core, characterized in that the reel core comprises fixed reel core strips (4) disposed in spaced relationship along the periphery,
5 together with at least one radially movable reel core strip (7) disposed therebetween.
2. A reel according to claim 1, characterized in that a radially movable reel core strip (7) is supported by a radially movable support arm (8).
- 10 3. A reel according to claim 2, characterized in that the radially movable support arm (8) cooperates with a hydraulic actuator (16).
4. A reel according to claims 1-3, characterized in that the movable reel core strip (7) is supported by
15 a pressure fluid allowing a gradual inward movement of the movable strip (7) during shrinkage of a plastic tube (23) coiled on the core.
5. A reel according to claims 1-4, characterized in that a radially movable reel core strip (7) is
20 supported by a radially movable support arm (8) which pivotally cooperates with a securing arm (9) being also pivotally connected via pivot (11) to a fixed frame (10) and a cam (13) is provided which cooperates with the securing arm (9) and with a slide valve (14) connected
25 to actuator (16) via a rod.
6. A reel according to claims 1-5, characterized

in that a plastic tube (23) made of a plastic which undergoes considerable recrystallization, more particularly polybutylene, is coiled on the reel (1).

7. A method of coiling a plastic tube on a reel
5 (1) comprising at least a reel core, characterized in
that a plastic tube (23) made of a plastic which
undergoes considerable recrystallization is coiled at
elevated temperature on a reel according to any one
of claims 1-6.
- 10 8. A method according to claim 7, characterized
in that the movable reel core strips(s) of the reel are
supported by a pressure fluid allowing a gradual inward
movement of the movable strip during shrinkage of a
plastic tube coiled on the core of the reel (1).
- 15 9. A method according to claim 7, wherein the
plastic tube (23) is coiled at a temperature of at
least 90°C.

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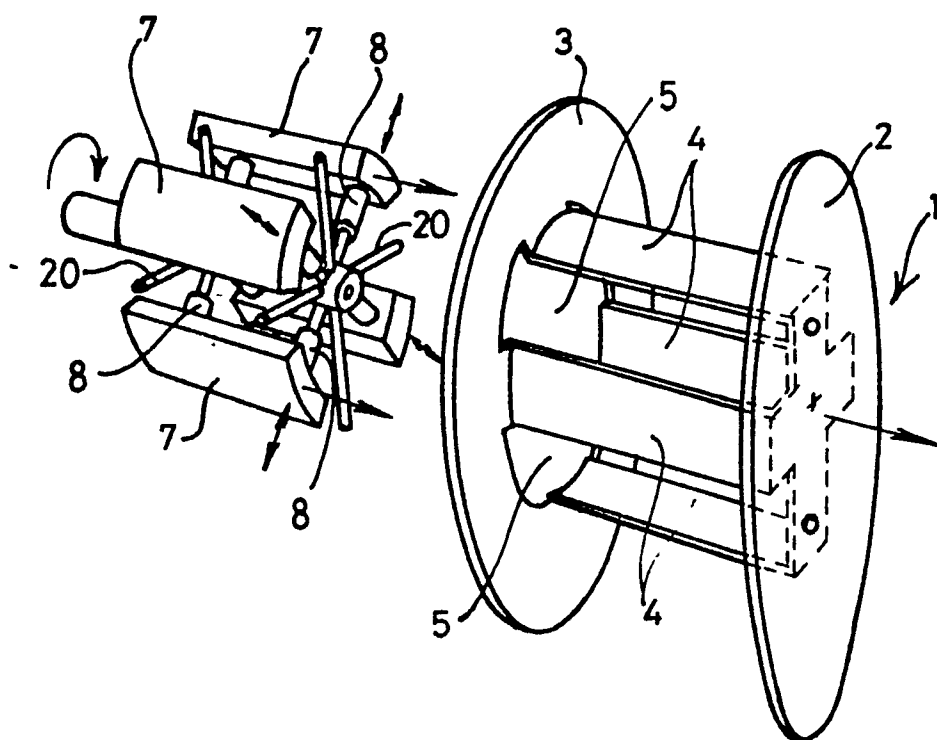
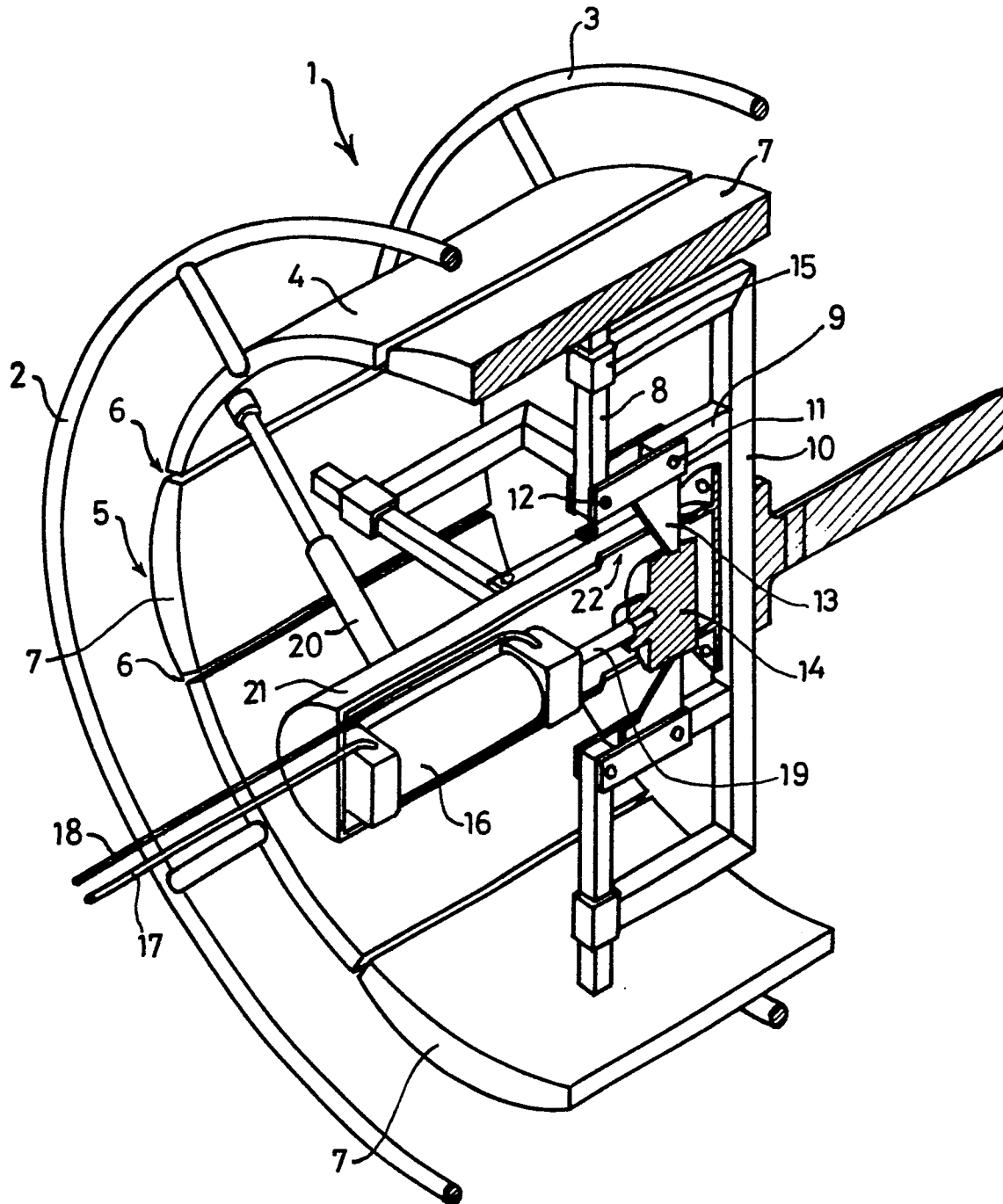
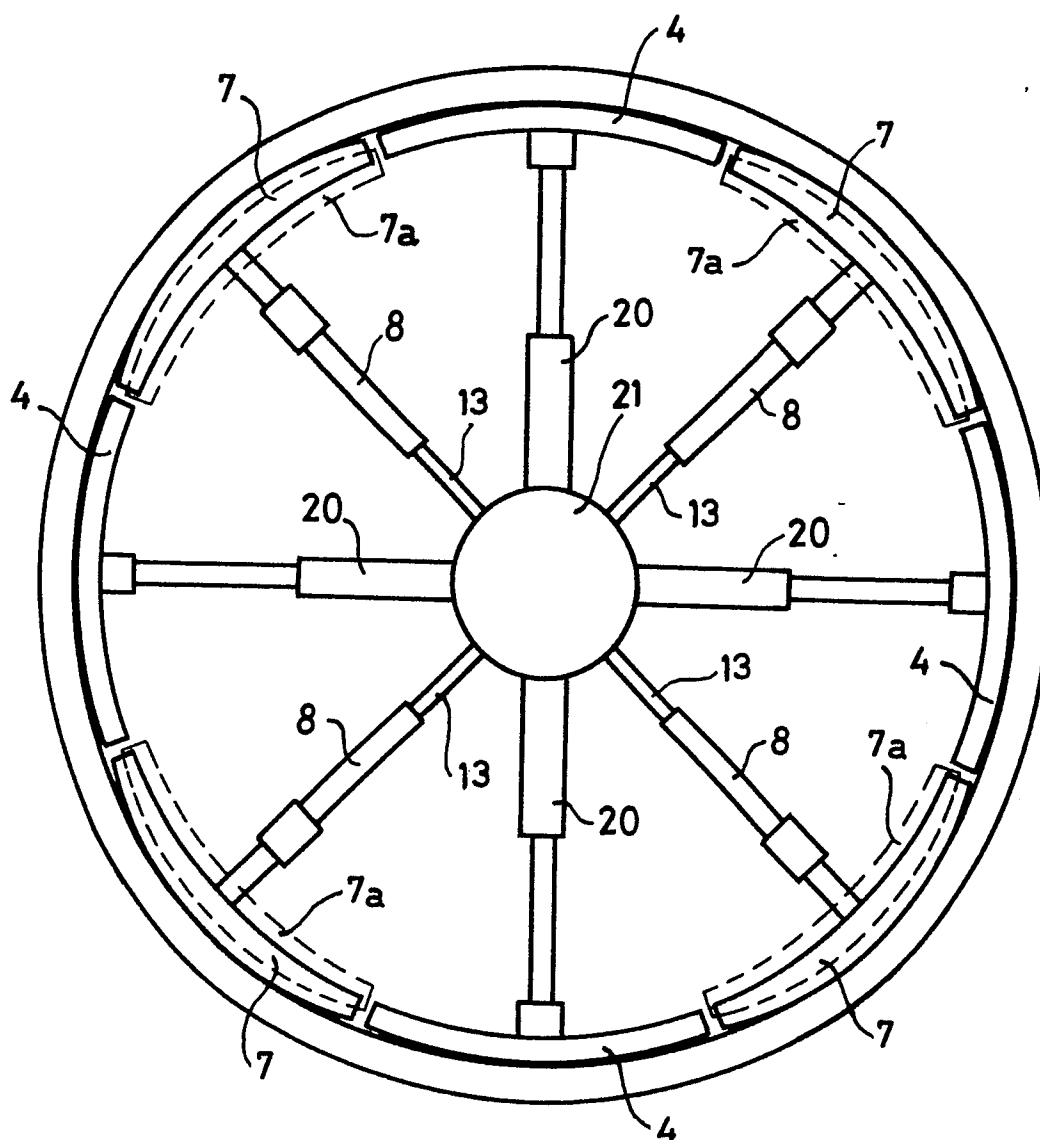


FIG. 1.

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**FIG: 2.**

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**FIG. 3.**



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EUROPEAN SEARCH REPORT

0101134

Application number

EP 83 20 1172

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
X	FR-A-2 223 293 (DRAHTWARENFABRIK DRAHTZUG STEIN) * Whole document *	1-4	B 65 H 54/58 B 65 H 75/24
X	US-A-2 646 233 (GAZET) * Column 2, lines 31-50; column 3, lines 1-20 *	1	
A	CH-A- 618 141 (S.U.T.E.) * Page 1, left-hand column, lines 66-68; figure 3 *	1	
A	DE-A-1 604 555 (KABEL- UND METALLWERKE GUTENHOFFNUNGSHÜTTE) * Page 2, lines 6-15 *	5,6	
A	EP-A-0 049 552 (TO THE NAME OF THE APPLICANT)		TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
A	NL-A-7 500 447 (HOESCH WERKE)		B 65 H
A	US-A-2 558 689 (MILLER)		
A	US-A-2 714 493 (GRAMP)		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 14-11-1983	Examiner D HULSTER E.W.F.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			



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EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
A	US-A-3 275 261 (HANSCOM) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 14-11-1983	Examiner D HULSTER E.W.F.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			