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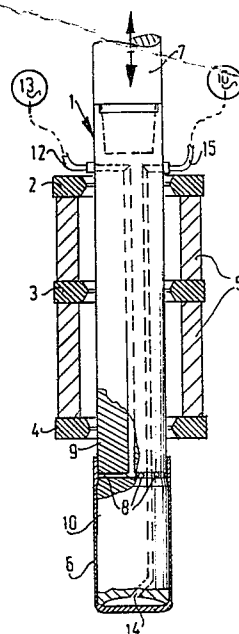
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Method of releasing a wall-ironed sleeve from a wall-ironing mandril and wall-ironing mandril for carrying out the same.

This invention relates to a method of releasing a wall-ironed sleeve (6) having an enlarged wall thickness at the end remote from the sleeve bottom from a wall-ironing mandril and is characterized in that a fluid is admitted at the transitional region between the normal wall thickness and the enlarged wall thickness.



Method of releasing a wall-ironed sleeve from a wall-ironing mandril and wall-ironing mandril for carrying out the same.

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The invention relates to a method of releasing a wall-ironed sleeve having an enlarged wall thickness at the end remote from the bottom from a wall-ironing mandril. Such a method is known from U.S. Patent specification 5 3,524,338. According to the technique taught by said U.S. Patent a pressurized fluid is introduced at the front face of the wall-ironing mandril. For a good understanding of the disadvantageous effects of such a method it is pointed out that attempts have to be made to overcome the clamping 10 force by which the sleeve is shrunk on the wall-ironing mandril. This clamping force is generated by cooling down after heating during the wall-ironing process.

By the introduction of pressurized fluid at the front face of the mandril the bottom of the wall-ironed 15 sleeve is very heavily loaded so that it may readily be plastically deformed or damaged. This load serves to produce a tractive force exceeding the frictional force to be over-

come, produced by the sleeve being clamped to the mandril as described above. This mode of operation involves that exclusively sleeves of a material having a relatively low Young's modulus can be used. The known method of the aforesaid U.S. Patent cannot possibly be used for construction materials having higher Young's moduli, for example, sheet iron, steel or the like.

A further disadvantage of the prior art is that the introduction of fluid at the front face of the wall-ironing mandril brings about the risk of bottom deformation as well as the risk of the sleeve being, so to say, shot away, which may give rise to unsatisfactory process control and to disturbances in automatic processes.

The invention has for its object to obviate the disadvantages of the prior art and provides a method of the kind set forth in which the fluid is allowed to enter at the transitional region between the normal wall thickness and the enlarged wall thickness. It is pointed out that the axial position of the admission of the fluid corresponds to a region where no wall-ironing operation takes place, since otherwise fluid inlet apertures might become clogged, the fluid being now admitted as near as possible the zone where the operation concerned is carried out in order to maximize the effect.

The fluid pressure preferably amounts to at least 10 bars. Experiments with tinned iron sleeves having a wall thickness of about 0.1 mm have shown that, for example, at a fluid pressure of about 25 bars the sleeve can be released substantially without friction.

The invention furthermore relates to a wall-ironing mandril suitable for carrying into effect the method according to the invention, said mandril having a cylindrical, relatively broad part, a cylindrical, relatively narrow part coaxial to the former and a substantially conical part interconnecting said two cylindrical parts and at least one fluid inlet conduit opening out at the operative surface, said wall-ironing mandril being characterized in accordance

with the invention in that the at least one fluid inlet conduit opens out in the region of the transitional part between the cylindrical, relatively narrow part and the conical part.

5 Preferably, a plurality of fluid inlet apertures are arranged along the circumference.

 In order to reliably prevent the sleeve from being explosively released, there is preferably provided at least one pressure equalizing duct opening out at the
10 front face. This excludes at the same time any risk of the atmospheric pressure between the front face of the mandril and the bottom of the sleeve deforming the sleeve bottom and the neighbouring wall parts.

 A very simple embodiment is obtained in which
15 the pressure equalizing duct is in open communication with the atmosphere.

 By the method and the wall-ironing mandril according to the invention sleeves having wall thicknesses of even less than 0.1 mm can be stripped off the wall-
20 ironing mandril without deformation of the material.

 According to the invention an appreciable saving of material can be obtained by reducing length differences between the initially manufactured and the finally trimmed sleeves. Moreover, disturbances of the process are minimized,
25 which is conducive to the productivity, whilst in addition the various tools have a considerably longer lifetime, which means saving of costs.

 The invention will be described more fully with reference to a drawing. This drawing shows in

30 Figure 1 a schematic cross-sectional view of a device for carrying out the method embodying the invention,

 Figure 2 a cross-sectional view of a wall-ironing mandril embodying the invention, and

 Figure 3 a detail indicated by III in Figure 2.
35 The device schematically shown in Figure 1 com-

prises a wall-ironing mandril 1 embodying the invention,
a first wall-ironing ring 2, a second wall-ironing ring 3,
a third wall-ironing ring 4 as well as a frame 5 inter-
connecting the three wall-ironing rings. The wall-ironing
5 mandril is axially driven by means of a plunger 7 actuated
by means not shown and being rigidly connected by known
coupling means with the wall-ironing mandril 1. In the
situation shown the device is in that stage of the
wall-ironing process in which a formed sleeve 6 has to be
10 released from the wall-ironing mandril 1.

In this embodiment of the invention the wall-
ironing mandril has a plurality of circumferentially disposed
fluid inlet apertures 8 located in the area of a transitional
part shown in the drawing, particularly figures 2 and 3,
15 between the relatively narrow part 9 of the wall-ironing
mandril 1 and the conical part 11 connecting the narrow part
9 with the relatively broad part 10 with a view to the
releasing operation..

The fluid inlet apertures 8 communicate in the
20 manner illustrated in figure 1 through a flexible pressure
duct 12 with a source 13 of pressurized fluid.

This pressurized fluid source is energized
synchronously with the displacement of the plunger 7 or
continuously in a manner such that the releasing operation
25 takes place after the accomplishment of the wall-ironing
operation proper.

With respect to the specific positions of the
apertures 8 in the embodiment concerned it is noted that if
the apertures are nearer the open end of the sleeve the
30 effectiveness is lower, whereas if the apertures are nearer
the bottom, material will be pressed into the apertures
during the wall-ironing operation, which would render the
release more difficult, whilst during release scraps of
material might settle on the outer side of the mandril.

35 At its front face the wall-ironing mandril 1 has

a fluid inlet aperture 14 which communicates in the manner shown in figure 1 through a second pressure duct 15 with a second source 16 of pressurized fluid, for example, compressed air. This source is also energized synchronously with the
5 displacement of the plunger 7 or else permanently.

Various variants of the embodiment shown are possible. For example, the axial positions of the apertures 8 may be chosen within wide limits on either side.

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CLAIMS

1. A method of releasing a wall-ironed sleeve having an enlarged wall thickness at the end remote from the sleeve bottom from a wall-ironing mandril characterized in that a fluid is admitted at the transitional region
5 between the normal wall thickness and the enlarged wall thickness.
2. A method as claimed in claim 1 characterized in that the fluid pressure amounts to at least 10 bars.
3. A wall-ironing mandril for carrying out the
10 method claimed in either of the preceding claims, said mandril having a cylindrical, relatively broad part, a cylindrical, relatively narrow part coaxial with the former and a substantially conical part interconnecting said two cylindrical parts and at least one fluid inlet conduit

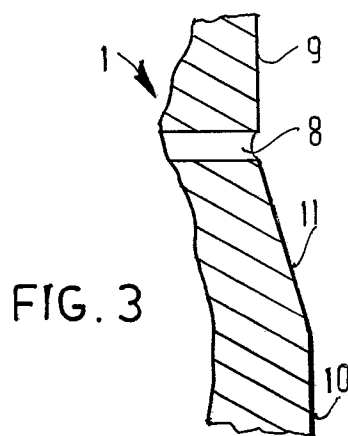
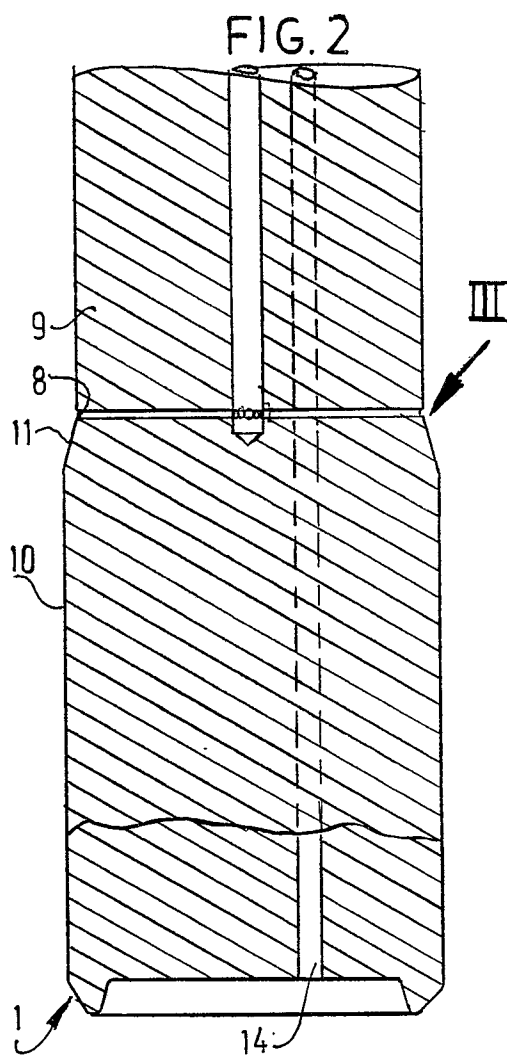
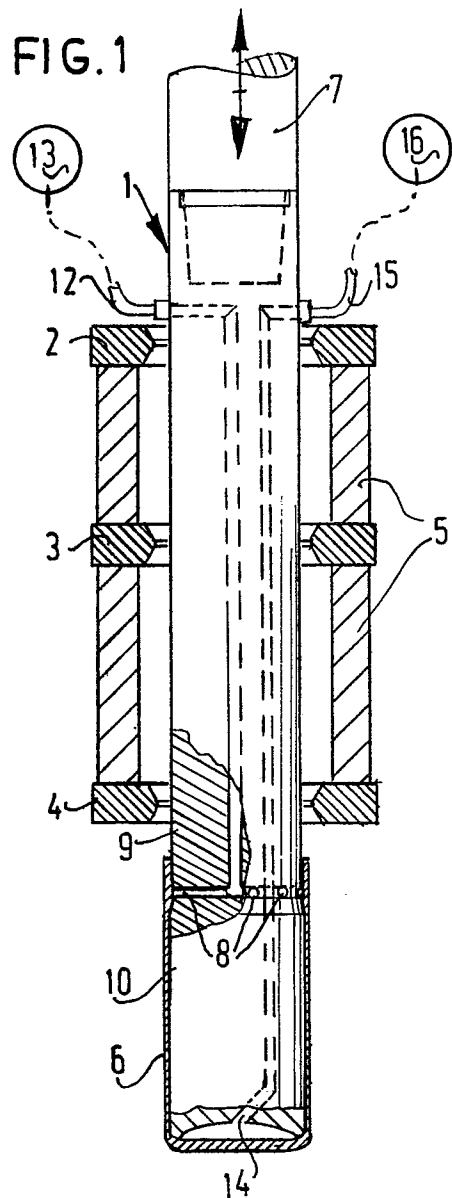
opening out at the operative surface characterized in that at least one fluid inlet conduit opens out in the region of the transitional part between the cylindrical relatively narrow part and the conical part.

5 4. A wall-ironing mandril as claimed in claim
3 characterized by a plurality of circumferentially disposed
fluid inlet apertures.

 5. A wall-ironing mandril as claimed in claim
3 or 4 characterized by at least one pressure equalizing
10 duct opening out at the front face.

 6. A wall-ironing mandril as claimed in claim 5
characterized in that the pressure equalizing duct is in
open communication with the atmosphere.

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EUROPEAN SEARCH REPORT

0045116

Application number

EP 81 20 0865

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	<u>US - A - 3 771 344</u> (CROWN CORK & SEAL COMPANY)	1	B 21 D 45/06
A	<u>US - A - 3 402 591</u> (MAEDER)	1	
D	<u>US - A - 3 524 338</u> (BOZEK)	1	
A	<u>US - A - 3 406 554</u> (FRANKENBERG)	1	
-----			TECHNICAL FIELDS SEARCHED (Int. Cl.)
			B 21 D
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
			&: member of the same patent family. corresponding document
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
The Hague	03-11-1981	PEETERS L	