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(54) An apparatus for sucking out liquid from a length of fabric

(57) An apparatus for sucking out liquid from a length of fabric (3, 4) comprises a suction pipe (1) with a longitudinal suction slot, through which the liquid is sucked into the interior of the suction pipe (1) due to a vacuum established therein. The apparatus comprises furthermore a flexible resilient covering line (12), one end of which is connected to the suction pipe (1) at the end of the suction slot (2). This covering line (12) extends along the outer side of the suction slot (2) and at least forward to an area immediately inside the location where the adjacent edge of the length of fabric (3, 4) is positioned during use of the apparatus. Then the covering line (12) extends forwards and into connection with a carrying means (5) arranged outside the suction slot (2), said covering line (12) being kept by the effect of the vacuum in a stretched state and adapted to automatically position in a sealing manner against the adjacent area of the suction slot (2) which is positioned outside the length of fabric (3, 4). The carrying means (5) forms a guide rail extending parallel to the suction slot (2) and for supporting means (15 to 18) displaceably and releasably arranged thereon. The supporting means are adapted in an area adjacent the suction slot (2) to support the covering line (12) extending from the adjacent edge of a length of fabric when seen in a direction perpendicular to the length of fabric (3, 4).

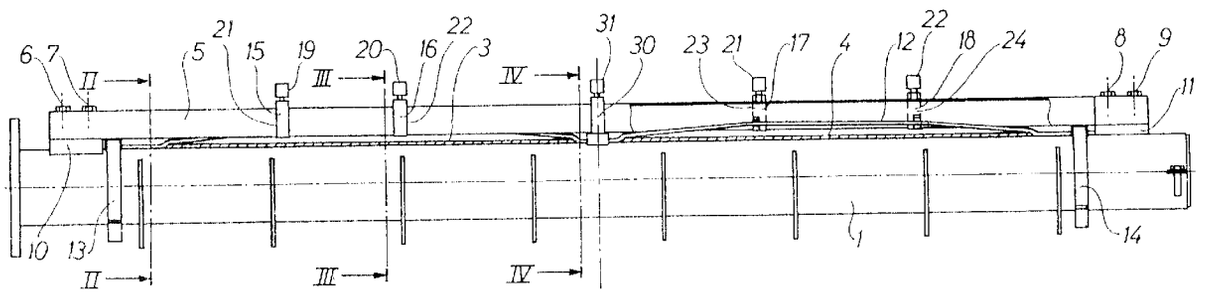

Fig. 1

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Description

The invention relates to an apparatus for sucking out liquid from a length of fabric, said apparatus comprising a suction pipe with a longitudinal suction slot allowing the liquid to be sucked into the interior of the suction pipe by way of a vacuum established therein, and a flexible, resilient covering line, which at one end is connected to the suction pipe at the end of the suction slot and which extends along the outer side of said suction slot and at least to an area immediately inside the location where the adjacent edge of the length of fabric is positioned during the running of the apparatus, and from which the covering line passes forward and into connection with a carrying means for said covering line which is arranged outside the suction slot, said covering line being kept in a stretched state and adapted to automatically position in a sealing manner against the adjacent portion of the suction slot while exerted to the vacuum in the suction pipe, said portion of the suction slot being positioned outside the length of fabric.

It is known to use such an apparatus for sucking out dye from the length of fabric passing from one roller to another roller in a jigger for dyeing or washing lengths of fabric in form of lengths of cloth. The suction pipe and the associated suction slot are of a length corresponding to the maximum width of one or more lengths of fabric plus a suitable additional length with the result that sufficient space is provided for possible variations in the width of the length of fabric and optional sideways displacements. In order to ensure an efficient sucking out of the dye or the liquid from the length of fabric, the suction slot is covered outside said length of fabric. It is known to use a round covering line in form of a rubber string for this purpose. In the area immediately above the edge of the length of fabric this line or string is fastened by means of a system of rollers or weights compensating for alteration of the length of the rubber string when said string is sucked downwards to the suction slot. In addition it is ensured that the rubber string can be sucked downwards into the suction slot so as to reach the length of fabric. Such known extraction apparatuses have been described for instance in the US-PS Nos. 4,672,711 and 2,792, 587.

The object of the invention is to provide an apparatus of a relatively simple structure and requiring relatively limited space both in the direction away from the suction pipe and transverse to the suction slot, and which simultaneously ensures an efficient adjustment to relatively large variations of the position of the edge of the length of fabric relative to the suction slot when seen in the longitudinal direction of said suction slot.

The above apparatus is according to the invention characterised in that the carrying means forms a guide rail parallel to the suction slot for a supporting means displaceably and releasably arranged thereon, said supporting means being adapted to support the covering line extending from the adjacent edge of a length of fabric in an area adjacent the suction slot when seen in a direction perpendicular to said length of fabric.

As a result it is possible in a relatively simple manner to adjust the supporting means for the covering line a suitable distance inwards over the length of fabric in question, said adjustment being allowed adjacent the side of the length of fabric facing away from the suction pipe. In use the covering line is kept in a stretched state and extends while slightly inclining from the latter side of the length of fabric downwards towards the edge area of the adjacent length of fabric and further to its fastening spot on the suction pipe. By displacement of the supporting means, the apparatus is easily adjusted to various lengths of fabric. As a result an efficient sealing of the suction slot is ensured outside the edge of the length of fabric, and the covering line can easily follow possible variations in the position of the edge in question. These variations can often be in the range of from 200 mm to 500 mm.

According to the invention, the covering line may extend from one end of the suction slot to the opposite end, whereby its ends are secured to their respective ends of the suction pipe, and a supporting means for the covering line may be provided in connection with each edge of the length of fabric to be treated, and the guide rail carrying supporting means may be integrally shaped. As a result an covering of the suction slot at both ends of the suction pipe is provided in a simple manner. When the apparatus is to be used for treating more, such as two lengths of fabric extending in parallel, it is according to the invention possible to provide a line pressing means which is displaceably arranged on the guide rail and adapted to press the covering line against the suction slot in the area which in use is positioned between two adjacent lengths of fabric, and a supporting means may be provided for each of the opposing edges of the adjacent lengths of fabric. As a result a sealing closing is provided in a simple manner of all the areas of the suction slot not covered by lengths of fabric.

The covering line may according to the invention be associated with a spring device for exerting said covering line to an additional tractive force in its longitudinal direction with the result that an additional resilience is obtained of said covering line.

This spring device may according to the invention advantageously be a pneumatic spring, one end of which is connected to an end of the covering line, and the opposite end of which is secured to the guide rail.

According to a particularly simple embodiment of the invention, the guide rail may be a U-shaped guide rail arranged with the opening facing downwards towards the suction slot, and the ends of which are secured to the suction pipe.

Each supporting means may according to the invention be a closed strap extending round the U-shaped rail and comprising a screw for a manual screwing of said strap onto the guide rail, said strap furthermore comprising a guide block for the covering line, where said guide

block projects into the interior of the guide rail. The resulting supporting means is of a particularly simple structure which allows a retaining of the covering line at a relatively short distance from the length of fabric in question.

The guide block may according to the invention particularly advantageously comprise a hole allowing the covering line to extend therethrough in such a manner that it can slide freely to and fro in said hole substantially parallel to the suction slot.

Finally means may according to the invention be provided for retaining the pneumatic spring in the interior of the U-shaped guide rail.

The invention is explained in greater detail below with reference to the accompanying drawing, in which

Figure 1 is a front view of an apparatus according to the invention which is used in connection with two lengths of fabric being advanced in a direction perpendicular to the plane of the drawing, a sectional view of portions of the guide rail being shown,

Figure 2, Figure 3 and Figure 4 are sectional views on a larger scale taken along the line II-II, III-III and IV-IV, respectively, of Figure 1, and

Figure 5 corresponds to Figure 1, but showing a different embodiment of a portion of a suction pipe with an associated guide rail used in connection with a single length of fabric, a partially sectional view of said guide rail and the associated members appearing.

The apparatus illustrated in Figure 1 comprises a suction pipe 1 of a circular cross section, cf. Figures 2 and 3, and with a longitudinal suction slot 2. In a manner not shown in greater detail the suction pipe is connected to a suction pump in such a manner that in use of the apparatus, a vacuum can be established in the interior of said suction pipe 1. When the apparatus is used, such as in a jigger for dyeing lengths of cloth, a length of fabric 3, 4 is advanced across the suction pipe 1 with the result that said lengths of fabric are passed directly over the suction slot 2, cf. Figure 3, whereby the vacuum in the interior of the suction pipe 1 can suck liquid out of said lengths 3, 4.

A guide rail 5 is mounted parallel to the suction pipe 1 directly in front of the suction slot 2, said guide rail being of a U-shaped cross section, cf. Figures 2, 3 and 4. This guide rail is secured by means of bolts or other suitable fastening means 6 to 9 and suitable spacers 10 and 1 1 to each end of the suction pipe 1 outside the area of the suction slot 2, which accordingly does not extend to the very ends of said suction pipe 1.

A line 12 is mounted between the guide rail 5 and the suction pipe 1, said line 12 covering the portions of the suction slot 2 not being covered by the lengths of fabric 3 and 4 when the apparatus is in use. This covering line 12 is flexible and resilient and can be made of any suitable material, preferably silicone rubber of a diameter of approximately 4 to 10 mm. The covering line 12 is arranged and secured in a stretched manner between two fastening straps 13, 14 at each end of the suction pipe 1 and also outside the area of the suction slot. The covering line 12 is arranged in such a manner that in the idle state it extends completely parallel to the suction slot directly outside said suction slot.

As illustrated in Figures 1 and 2, a plurality of supporting means 15 to 18 are mounted on the guide rail 5 for the covering line 12 and inside the area above the lengths of fabric 3, 4 in question. These supporting means 15 to 18 are displaceably arranged on the guide rail 5 and adapted to be manually screwed onto the guide rail 5 by means of respective screws 19 to 22 on suitable spots relative to the lengths of fabric 3, 4 in question.

The supporting means 15 to 18 comprise a closed rectangular strap 21 to 24 passing around the guide rail 5. On the side extending between the free edges 25, 26, cf. especially Fig, 3, of the U-shaped guide rail 5, the straps 21 to 24 carry a guide block 27 with a through hole 28 allowing passage of the covering line 12. The inner side of the hole 28 is provided with a suitable lining 29 for protecting the covering line 12. The inner diameter of the hole 28 is of such a size that the covering line 12 can pass freely through said hole 28.

As illustrated above, the apparatus shown in Figures 1 to 4 is in the shown embodiment used for treatment of two lengths of fabric 3. 4. A pressing means 30 is mounted on the guide rail 5 outside the area between these two lengths of fabric 3. 4. As illustrated in Figure 4, this pressing means 30 is used for pressing the covering line 12 downwards towards the suction slot 2, and for this purpose said pressing means is shaped substantially identical with the supporting means 15 to 18. Thus the pressing means 30 also comprises a screw 31 for a manual fastening of said pressing means 30 onto a suitable spot on the guide rail 5 and a closed strap 31. Unlike the supporting means 15 to 18 provided with the guide blocks 27 for the pressing line 12, the pressing means 30 comprises in stead a U-shaped guide means 32 for the covering line 12. This guide means 32 is mounted on the portion of the strap 31 extending between the free edges 25 and 26 of the guide rail 5 and extends downwards towards the suction slot 2 of the suction pipe 1 in such a manner that the covering line 12 is kept in a sealing connection with the suction slot 2 by means of said guide means 32.

As illustrated in Figures 1, 3 and 4, the covering line 12 is thus both secured to the suction pipe 1 at each end and extends upwards through the holes 28 in the respective supporting means 15 and 16. Furthermore, the covering line 12 is pressed downwards towards the suction pipe 1 by means of the pressing means 30.

In use, the apparatus employs a plurality of supporting means 15 to 18 and pressing means 30 correspond-

ing to the number in question of lengths of fabric 3, 4. Thus two supporting means 15 to 18 are used outside each length of fabric 3, 4, and one pressing means 30 for each of the spaces appearing between the number in question of lengths of fabric 3, 4. The individual supporting means 15 to 18 are set and secured on the guide rail 5 above the length of fabric 3, 4 in question at a suitable distance from their respective longitudinal edges of the length of fabric 3, 4 in question. Before the covering line 12 is subjected to the vacuum inside the suction pipe 1, it is thus forced to extend in such a manner that it presents a relatively small inclination away from the respective contact spots with said suction pipe 1 and forwards to the respective supporting means 15 to 18. The position determined for the supporting means has furthermore the effect that while subjected to the vacuum inside the suction pipe 1, the covering line 12 extends in a slightly inclining manner from the respective longitudinal edges of the lengths of fabric 3, 4 and upwards to the respective supporting means 15 to 18. As a result, the covering line 12 can in an easy and relatively uniform manner follow possible variations in the position of the longitudinal edges of the lengths of fabric 3, 4 relative to the suction slot 2. Outside these edges, the pressing line 12 is sealingly sucked towards the sides of the suction slot 2, whereby it efficiently closes the otherwise covered portions of the suction slot in such a manner that the lengths of fabric 3, 4 are subjected to the desired efficient sucking out effect. The sealing closing of the suction slot 2 outside the lengths of fabric 3 and 4 and up to the varying position of the edges of said lengths of fabric 3 and 4 is of particular importance when conditions such as a relatively high temperature and moisture apply as well as when said lengths of fabric have been treated with chemicals.

The efficiency of the covering line 12 while covering portions of the suction slot 2 depends also on the resilience of said covering line. When the resilience available is not sufficient it is possible to insert one or more pneumatic springs, cf. Figure 5, in which a single spring is shown in connection with the covering line 12, said single spring being designated the reference numeral 35. Figure 5 illustrates a portion of an apparatus substantially corresponding to the portion shown in Figure 1. Thus the apparatus in question comprises also a suction pipe 1 and a guide rail 5 with a supporting means 18 corresponding to the supporting means 18 of Figure 1. The covering line 12 is interrupted above the length of fabric 4 in question and secured to the movable member 36 of a pneumatic spring 35. The fixed member 37 of the pneumatic spring 35 is secured by means of a suitable bracket 38 to the guide rail 5. A similar pneumatic spring 35 is mounted in a manner not described in greater detail on the opposite side of the bracket 38, said similar pneumatic spring 35 being connected to another portion of the covering line 12 in the same manner as shown in Figure 5. In order to prevent the pneumatic spring 35 from falling downwards towards the length of fabric 4, a supporting tray 39 covering the opening of the guide rail 5 towards the length of fabric. This supporting tray is carried by suitable clamping means 40 of the same type, generally speaking, as the supporting means 15 to 18. Thus a clamping means 40 is provided at both ends of the tray 39 when seen in the longitudinal direction of the guide rail 5.

The invention has been described with reference to a preferred embodiment. Many modifications can be carried out without thereby deviating from the scope of the invention. The covering line 12 may for instance be tubularly shaped and the guide rail 5 and consequently the covering line 12 may be non-through from one end of the suction pipe 1 to the opposite end thereof. The most important factor is that the guide rail 5 and the associated covering line 12 are adapted and mounted such that the pressing line 12 follows the illustrated path with a relatively small inclination relative to the suction pipe 1 in any use state. It is also possible to use helical springs instead of pneumatic springs.

When particularly narrow lengths of fabric are involved, the supporting means associated with the edge of each length of fabric may be a single supporting means common to both edges.

Both the supporting means 15 to 18 and the pressing means 30 may be easily releasably shaped with the result that they can be easily removed transverse to the guide rail 5 without necessitating a disengagement thereof. One side of the closed strap 31 may for instance be hinged to the remaining portion of the strap 31, cf. at 41 in Figure 4, whereby the second end 42 of the side in question is adapted to be coupled to the remaining portion of the strap 31 in a manner not described in greater detail. In the same manner the guide means 32 may in a way not described in greater detail be movably secured to the pressing means 30 with the result that it can be moved away from the area adjacent the suction pipe 1 when it is not used.

Claims

1. An apparatus for sucking out liquid from a length of fabric, said apparatus comprising a suction pipe (1) with a longitudinal suction slot (2) allowing the liquid to be sucked into the interior of the suction pipe (1) by way of a vacuum established therein, and a flexible, resilient covering line (12), which at one end is connected to the suction pipe (1) at the end of the suction slot (2) and which extends along the outer side of said suction slot and at least to an area immediately inside the location where the adjacent edge of the length of fabric (3, 4) is positioned during the running of the apparatus, and from which the covering line (12) passes forward and into connection with a carrying means (5) for said covering line (12) which is arranged outside the suction slot (2), said covering line (12) being kept in a stretched

state and adapted to automatically position in a sealing manner against the adjacent portion of the suction slot (2) while exerted to the vacuum in the suction pipe (1), said portion of the suction slot being positioned outside the length of fabric (3, 4), characterised in that the carrying means (5) forms a guide rail parallel to the suction slot (2) for a supporting means (15 to 18) displaceably and releasably arranged thereon, said supporting means being adapted to support the covering line (12) extending from the adjacent edge of a length of fabric in an area adjacent the suction slot (2) when seen in a direction perpendicular to said length of fabric (3, 4).

2. An apparatus as claimed in claim 1, characterised in that the covering line (12) extends from one end of the suction slot (2) to the opposite end thereof, whereby its ends are secured to their respective ends of the suction pipe (2), and that a supporting means for the covering line is provided in connection with each edge of the length of fabric (3, 4) to be treated, and that the guide rail (5) carrying the supporting means (15 to 18) is integrally shaped.

3. An apparatus as claimed in claim 2, and where it is adapted to treat several lengths of fabric (3, 4) extending in parallel, characterised in that a line pressing means (30) is provided, which is displaceably arranged on the guide rail (5) and adapted to press the covering line (12) against the suction slot (2) in the area which in use is positioned between two adjacent lengths of fabric (3, 4), and that a supporting means (15 to 18) is provided for each of the opposing edges of the adjacent lengths of fabric (3, 4).

4. An apparatus as claimed in claim 1, 2 or 3, characterised in that the covering line (12) is connected to a spring device (35) for subjecting the covering line (12) to an additional tractive force in its longitudinal direction.

5. An apparatus as claimed in claim 4, characterised in that the spring device (35) is a pneumatic spring, one end of which is connected to an end of the covering line (12), and the opposite end of which is secured to the guide rail (5).

6. An apparatus as claimed in one or more of the preceding claims 1 to 5, characterised in that the guide rail (5) is a U-shaped rail arranged with the opening facing downwards towards the suction slot (2), and the ends of which are secured to the suction pipe (1).

7. An apparatus as claimed in claim 6, characterised in that each supporting means (15 to 18) comprises a closed strap (21 to 24), which extends around the U-shaped guide rail (5) and is provided with a screw (19 to 20) for a manual screwing of the strap (15 to 18) onto the guide rail (5), and which furthermore comprises a guide block (27) for the covering line (12), said guide block projecting into the interior of the guide rail (5).

8. An apparatus as claimed in claim 6, characterised in that the guide block (27) comprises a hole (28) allowing the covering line (12) to extend therethrough in such a manner that it can slide freely to and fro in said hole (28) substantially parallel to the suction slot (2).

9. An apparatus as claimed in claims 5 and 6, characterised in that means (39, 40) are provided for retaining the pneumatic spring (35) in the interior of the U-shaped guide rail (5).

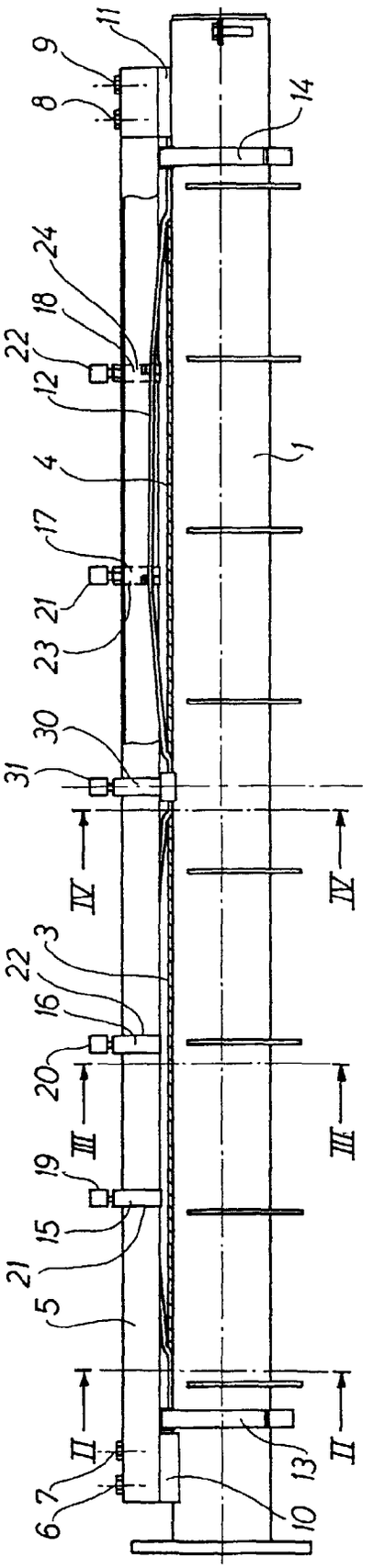
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Fig. 1

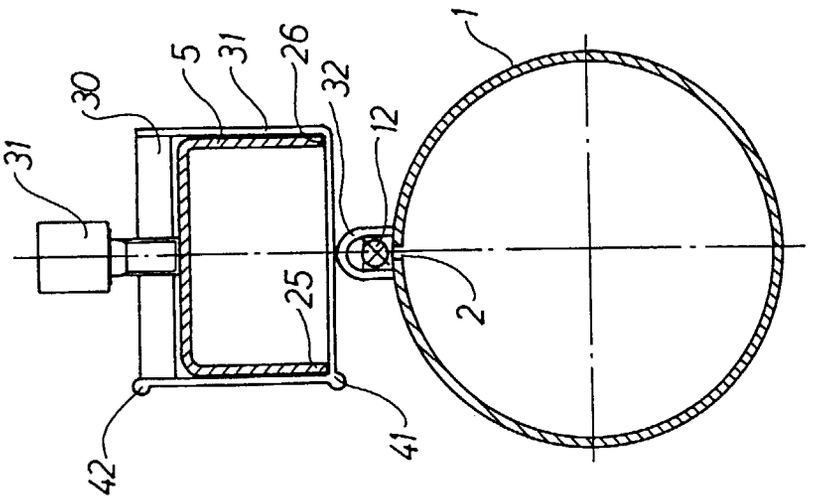

Fig. 4

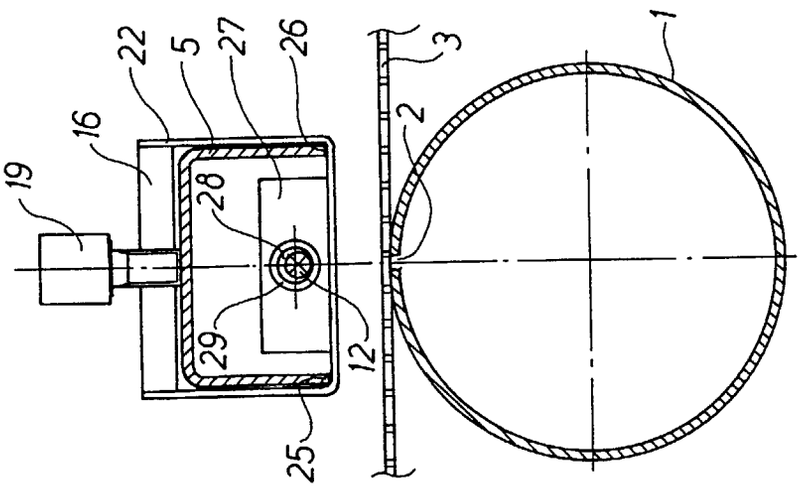

Fig. 3

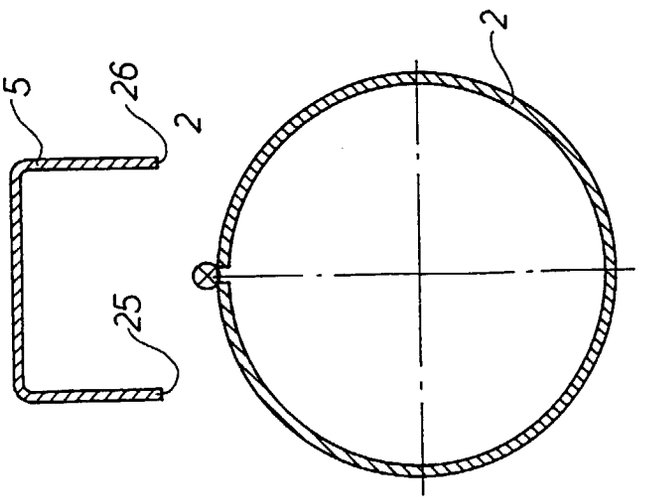

Fig. 2

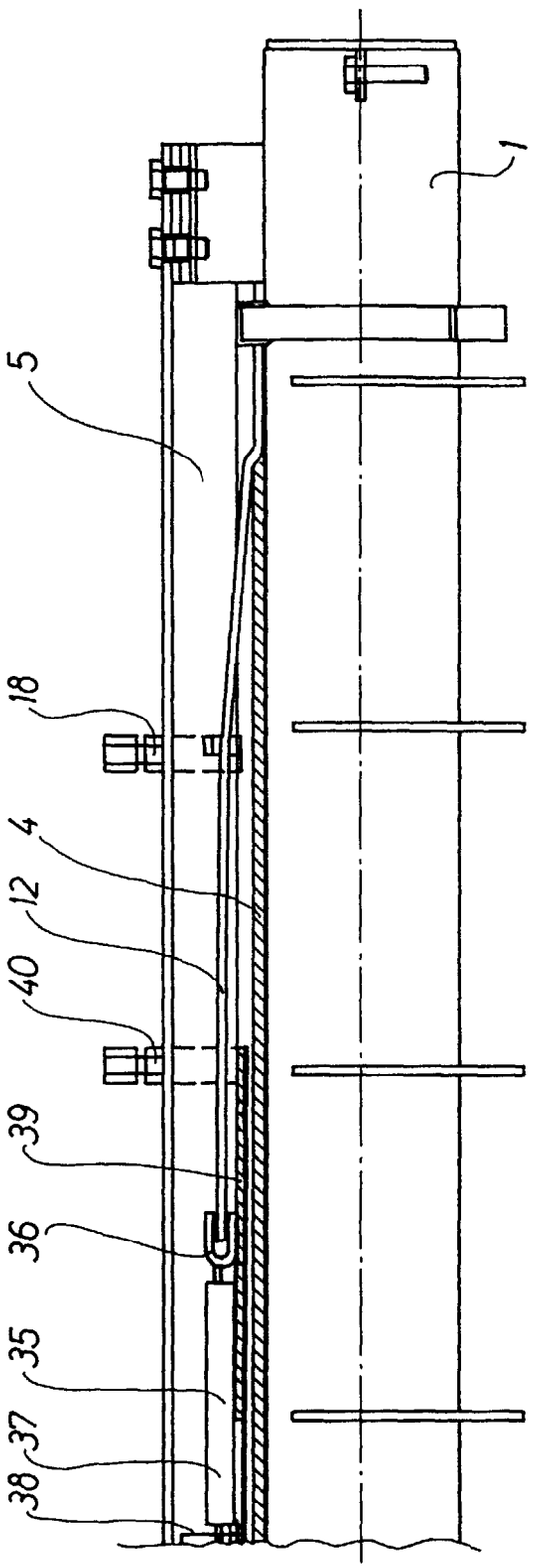

Fig. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 61 0047

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.6)
X	DE 270 824 C (GESSNER) * the whole document *	1,2	F26B13/30
A	US 2 001 417 A (GESSNER) * the whole document *	1	
A	US 1 576 679 A (SMITH)		
A	US 4 301 602 A (GRONDIN ET AL)		
A	US 3 735 444 A (CECERE)		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

F26B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	5 February 1998	Silvis, H

CATEGORY OF CITED DOCUMENTS

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