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54 Device to move the legs of a clamper excavator.

57 Clamber excavator device (10) provided with legs (15,16); the legs being capable of being swung vertically, and (15-16) being anchored to a support arm (118) by a first vertical pivot (19); so that the legs can swing horizontally and such support arm (118) is pivotally anchored to a base (11) by a first horizontal pivot (17); means (25-23) to orient a jack (24) anchored at a forward position (125) on the leg (15-16) being positioned above the first vertical pivot (19).

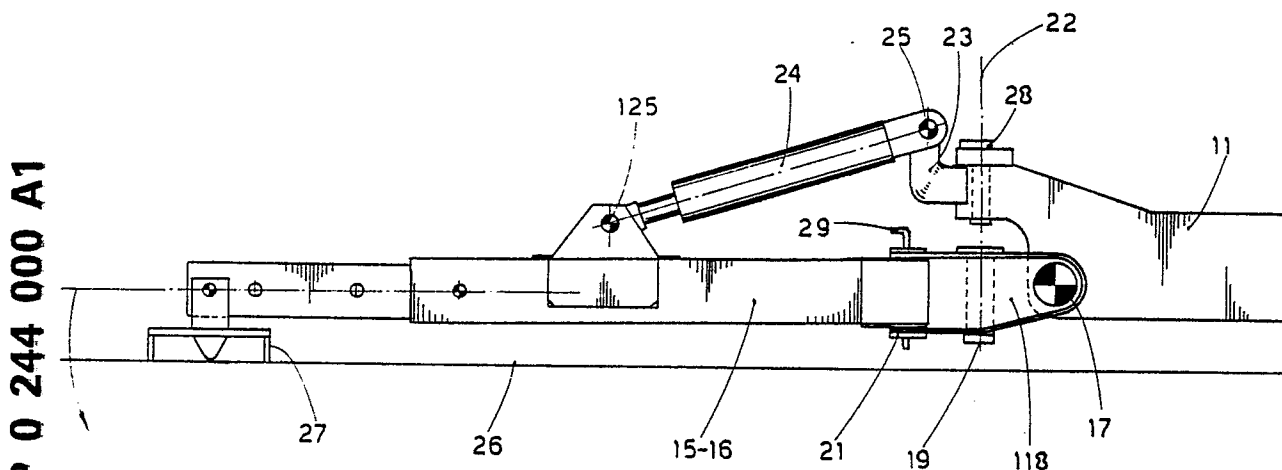


fig. 4

## "DEVICE TO MOVE THE LEGS OF A CLAMBER EXCAVATOR"

This invention concerns a device to move the legs of excavators and, in particular, concerns a system to control the vertical orientation of the legs.

The excavators with which the invention is concerned are of a type with four legs which can be swung in a vertical plane and in a horizontal plane. Such excavators are particularly suitable for work in areas containing slopes, ditches, river banks, rocky ground, etc.

At least the vertical orientation of the legs is actuated by jacks.

The legs of such excavators are secured to a base to which are fitted a driver's cab and an excavation arm.

Anchorage of the legs to the base is obtained with a pivot, which is usually horizontal, and with a sleeve within the leg. The sleeve is normally a part of a lever, which comprises a vertical pivot and at least one fixture plate with a plurality of holes.

The vertical pivot and this plate enable the remainder of the leg to swing in a direction normal to the direction of vertical swinging.

A jack which is secured to the base at the side of the driver's cab acts on the lever.

This system entails the drawback that, when the jack is extended, the lever arm tends to become shortened, thereby increasing the stress.

The system also makes it necessary to have very strong legs since the lever arm is very short and the leg is subject to bending throughout its length.

Another system is available which arranges for the jack to be fitted to the leg itself, thus creating an intermediate joint, but this system is not suitable on rocky or hard ground, for the spread-out legs, when swinging vertically, move their terminal portion in a lateral direction, thus reducing the distance between centres of their outer terminal portions during ascent of the legs and increasing that distance during descent of the legs.

This known embodiment is not suitable because, particularly on rocky ground, it leads to breakage of the legs or at least of the support plates fixed to the ends of the legs.

US 3,212,659 provides a support with a vertical swinging axis, to which support are hinged a leg, which cannot be adjusted laterally except in conjunction with such support, and a jack. This embodiment has the effect that, if the legs are swung vertically, the terminal points slide towards the axis of swinging of the support and thus move laterally. This is a serious drawback when it is necessary to work in the neighbourhood of walls or on difficult ground or in restricted spaces.

FR 1.310.448, FR 1.310.010, US 2,992,016, US 3,310,181, US 3,768,674 and US 4,241,803 provide the same drawbacks since they possess the same characteristics.

To obviate such drawbacks and, on the one hand, to make the legs less heavy while still retaining their strength and, on the other hand, to avoid breakages due to changes in the distances between centres of the end portions of the legs, the present applicant has studied, tested and embodied the very simple new solution of this invention.

According to the invention a jack is secured to the front of the base of the excavator, a support able to rotate substantially in a horizontal plane being interposed between the jack and the base.

The anchorage point of the jack is located above a horizontal pivot for vertical swinging of the leg and cooperates with a vertical pivot which enables the leg to swing horizontally.

The jack is secured to the leg in a forward position, thus reducing the stress on the leg-beam as in one of the known embodiments.

According to the invention the horizontal pivot on which the leg is able to swing vertically cooperates with the arm which supports the vertical pivot on which the leg can swing horizontally. This enables the leg to be positioned as required on the horizontal plane; it also enables the leg to swing vertically without the distance between centres of one terminal part, or foot, or support plate, and another having to be displaced and its value having to be changed.

The invention is therefore embodied with a device to move the legs of a clamper excavator, the legs being capable of being swung vertically, the device being characterized in that the legs are anchored to a support arm by a first vertical pivot so that the legs can swing horizontally and such support arm is pivotally anchored to a base by a first horizontal pivot, means to orient a jack anchored at a forward position on the leg being positioned above the first vertical pivot.

The attached figures are given as non-restrictive examples and show the following:-

Figs.1 and 2 show an existing embodiment;

Fig.3 shows another existing embodiment;

Figs.4 and 5 show the embodiment of the invention.

Figs.1 and 2 show an excavator 10 with a base 11 and a turret 12. The turret 12 bears an excavation arm 13 and a driver's cab 14.

Front 15 and rear 16 legs are secured to the base 11 and comprise a horizontal pivot 17 within a sleeve for vertical orientation, a lever 18, a pivot 19 for horizontal orientation and a fixture plate 21 to govern horizontal orientation.

Such fixture plates 21 are advantageous if the spreading apart of the legs is to be pre-set, but may also be associated with jacks that serve to spread apart the legs 15-16 in relation to a support arm 118.

A jack 20, which is secured laterally to the base 11, acts on the lever 18.

The legs 15-16 may comprise at their ends wheels or plates 27 to support them on the ground 26.

Fig.3 shows another known embodiment in which a pivot 119 works in the base 11 and enables the leg 15-16 to be oriented horizontally and possibly to be halted in a required position by a locking pin 29.

The leg 15-16 is properly anchored so as to be swung vertically on the support arm 118 by means of a pivot 117 and is actuated by a jack 120 acting between an arm 218 of such support arm 118 and the leg 15-16.

According to the invention (Figs.4 and 5) on a base 11 is located a first horizontal pivot 17 on which the support arm 118 that bears a first vertical pivot 19 for the horizontal orientation of a leg 15-16 can swing vertically.

The support arm 118 bears also the plates 21 to set, by means of a locking pin 29, the required position of horizontal orientation or spreading apart of the legs 15-16 in relation to the support arm 118.

A second vertical pivot 28 is comprised above the support arm 118 in the base 11 and in the example shown is substantially coaxial 22 with the first vertical pivot 19 when the leg is horizontal.

The second vertical pivot 28, however, can be in a more advanced or more retracted position than the axis 22.

A support 23 is able to swing on the second vertical pivot 28 and, with a second horizontal pivot 25, anchors a jack 24 which is secured to the leg 15-16 at 125.

Such support 23 can be straight or be angled as in the case shown. It could also be replaced with a single or double ball joint.

The support 23 together with the second horizontal pivot 25, or alternative articulation means, forms the means to anchor and orient the jack 24.

The position of the second vertical pivot 28 and the inclusion of the support 23, which makes possible the vertical orientation of the jack 24, cause the leg/jack system to work correctly and the leg to maintain at all times the proper distance between centres of the ends of the legs during vertical orientation.

The system also enables the lever arm to be lengthened during the lifting of the base 11, that is, during the lowering of the legs 15-16, thus reducing the stress required to perform such operation.

## Claims

1 - Device to move the legs (15-16) of a clam-ber excavator (10), the legs being capable of being swung vertically, the device being characterized in that the legs (15-16) are anchored to a support arm (118) by a first vertical pivot (19) so that the legs can swing horizontally and such support arm (118) is pivotally anchored to a base (11) by a first horizontal pivot (17), means (25-23) to orient a jack (24) anchored at a forward position (125) on the leg (15-16) being positioned above the first vertical pivot (19).

2 - Device as claimed in Claim 1, in which the means (25-23) to orient the jack (24) consist of a second substantially horizontal orientation pivot (25) and of a support (23), which is pivotally anchored to the base (11) by a second vertical pivot (28).

3 - Device as claimed in Claim 1, in which the means (25-23) to orient the jack (24) consist of an articulation means.

4 - Device as claimed in any claim hereinbefore, in which the second vertical pivot or rotation means (28) is coaxial (22) with the first vertical pivot (19).

5 - Device as claimed in any of Claims 1 to 3 inclusive, in which the second vertical pivot or rotation means (28) is positioned higher than the first vertical pivot (19) but is located in a position further forward than the latter.

6 - Device as claimed in any of Claims 1 to 3 inclusive, in which the second vertical pivot or rotation means (28) is positioned higher than the first vertical pivot (19) but is located in a position further rearward than the latter.

7 - Device as claimed in any claim hereinbefore, in which the support (23) is substantially straight.

8 - Device as claimed in any Claims 1 to 6 inclusive, in which the support (23) is angled.

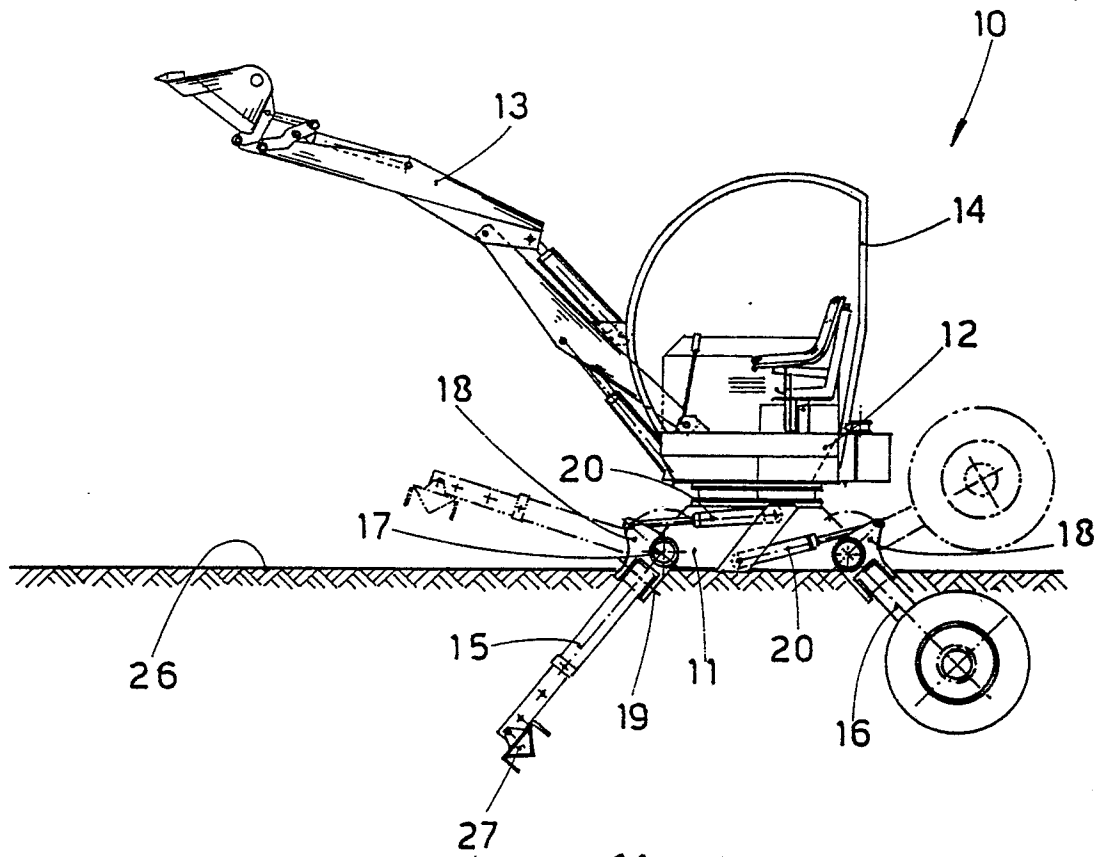


fig.1

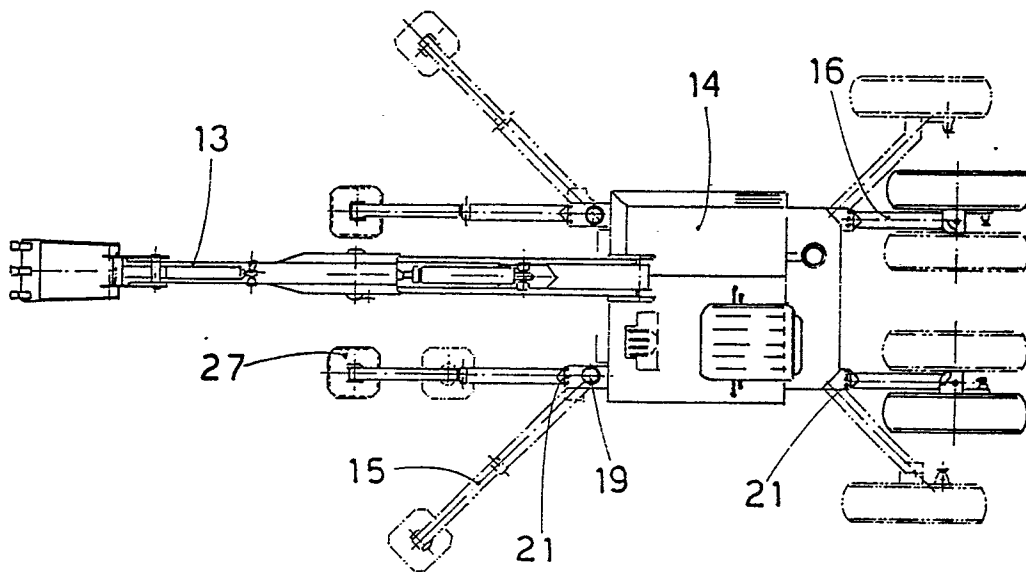
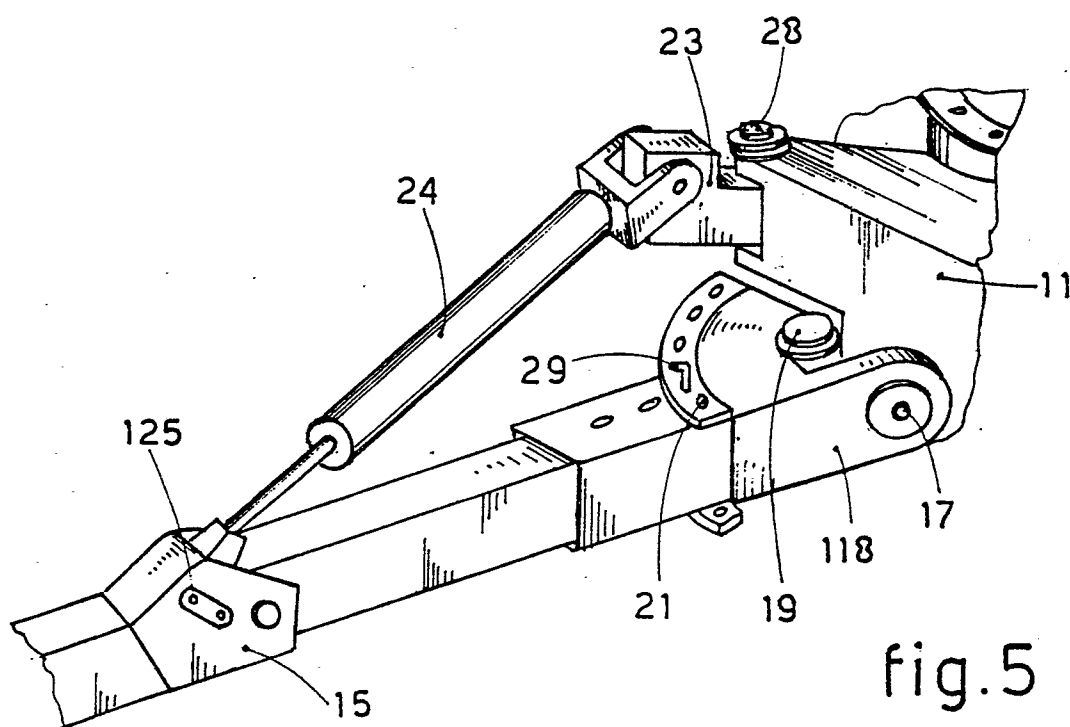
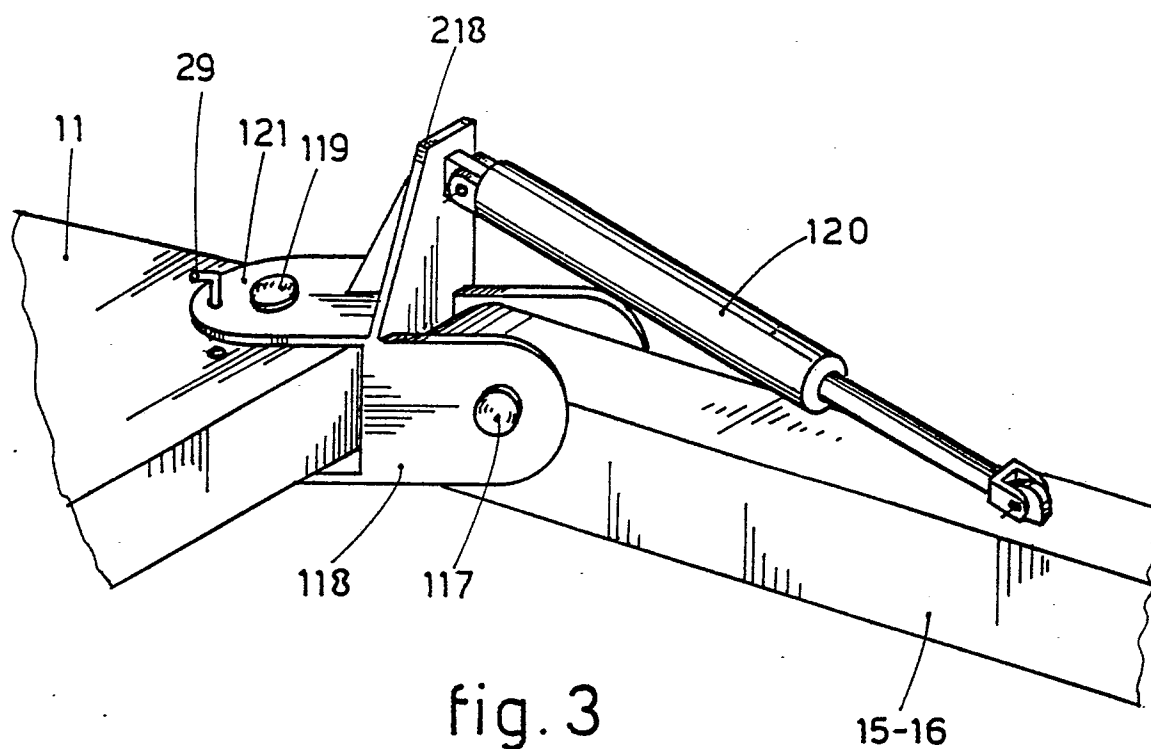


fig.2

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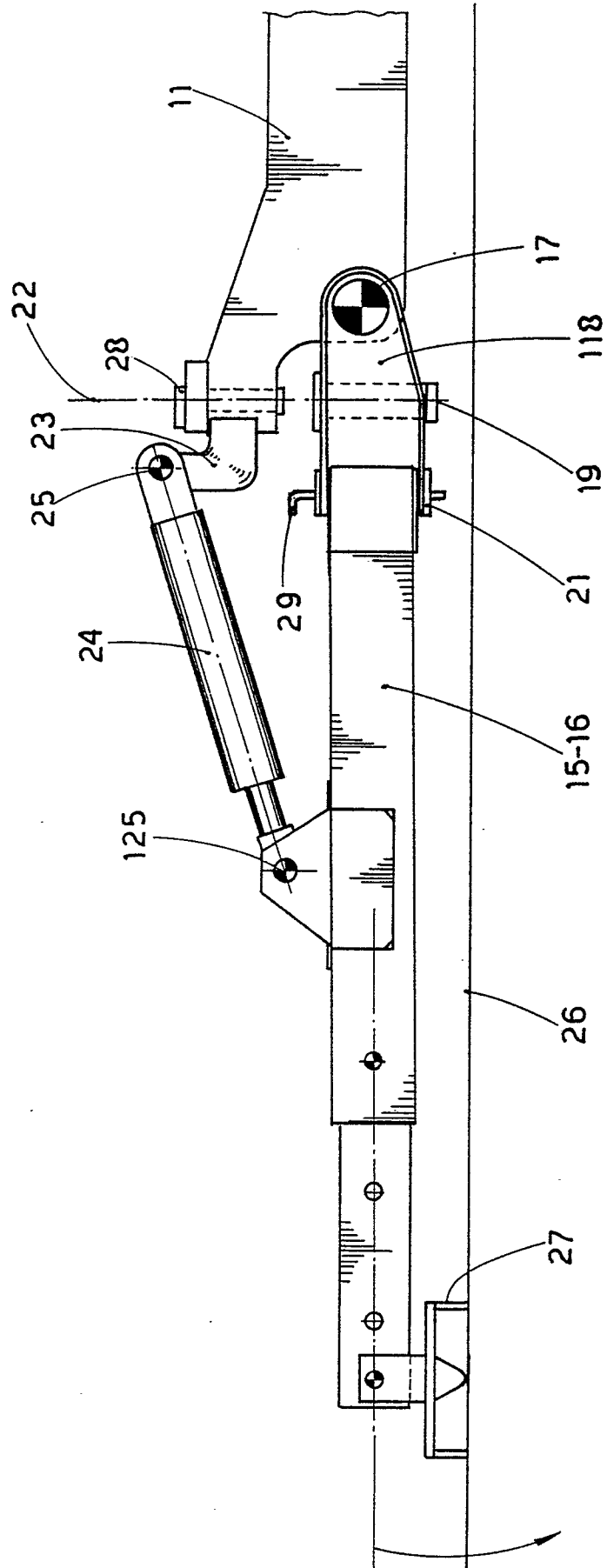


fig. 4

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EP 87 20 0631

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.4)
X,D	US-A-3 212 659 (G.P. KOCH) * Column 3, lines 33-54; figures 1,2 *	1-3,8	E 02 F 9/08
A		6	
A,D	FR-A-1 310 448 (ETABLISSEMENTS DUCLOS et Cie) * Page 2, column 2, line 51 - page 3, column 1, line 14; figure 3 *	1,3	
A,D	FR-A-1 310 010 (S.N.A. DE VENISSIEUX) * Figures 1,2 *	1	
A,D	US-A-2 992 016 (J.S. PILCH) * Figures 1-6 *	1	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A,D	US-A-3 310 181 (W.D. SYMMANK) * Column 3, line 65 - column 4, line 26; figures 1-8 *	1	E 02 F
A,D	US-A-4 241 803 (LAUBER) * Abstract; figures 1-5 *	1	
A,D	US-A-3 768 674 (E. MENZI) * Abstract; figures 1,2 *	1	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 02-06-1987	Examiner ANGIUS P.
<b>CATEGORY OF CITED DOCUMENTS</b>			
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	