(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 567 917 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **93106461.2**

(22) Date of filing: **21.04.93**

(51) Int. Cl.5: **B66C 1/24**, B66C 1/54, B65H 67/06

(30) Priority: **30.04.92 IT MI921024**

(43) Date of publication of application:
03.11.93 Bulletin 93/44

(84) Designated Contracting States:
CH DE FR GB LI SE

(71) Applicant: **SCAGLIA S.p.A.**
Via Marconi 42
I-24012 Brembilla (Bergamo)(IT)

(72) Inventor: **Scaglia, Enzo**
Via Monte Rosa, 21
I-20100 Milan(IT)

(74) Representative: **Marietti, Giuseppe**
STUDIO ASSOCIATO MARIETTI & PIPPARELLI
Viale Caldara 38
I-20122 Milano (IT)

(54) Holding device for balancing units.

(57) A load holding device in a balancing unit comprises means for balancing the centre of gravity of the same with respect to the suspension wire (2) of said unit, in presence of a load (12), said means comprising a first tubular element (5) that is integral with said device and fixed in a slanting position with reference to the vertical axis of said same, and a second tubular element (6), fixed at the lower end of said wire (2) and slidingly housed in an axial direction within said first tubular element (5) and fixed to the same by means of elastic means (9) urging the two elements in a retracted position.

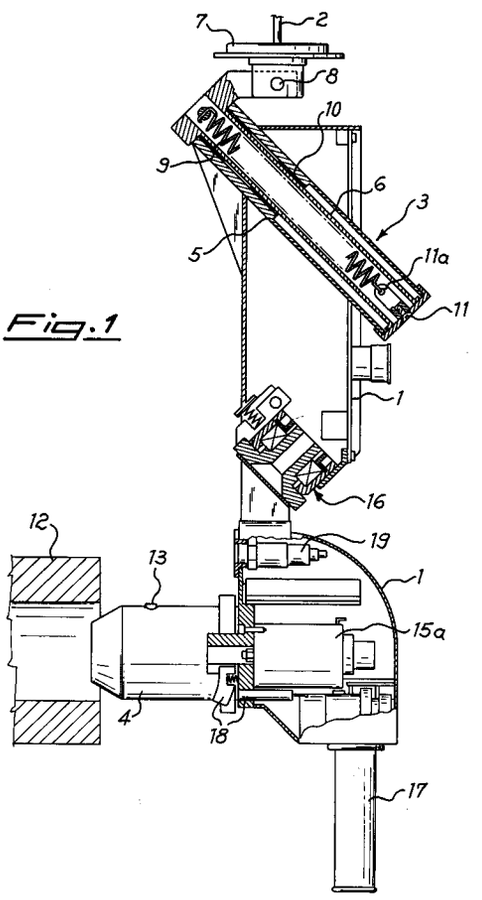

Fig.1

EP 0 567 917 A1

The present invention concerns a holding device for balancing units.

The balancing units, also known as weight zeroing devices, are well known since a long time and they essentially consist in a wire, provided on its lower end with a device for gripping and holding a load and, on its upper end, with a device which produces an upward thrust equal and opposed to the weight of the load which has been fastened below.

Balancing devices are used for numerous types of purposes, among which handling reels.

One of the problems which arise in the use of weight zeroing equipments described above, is that often the load which is fastened shifts the centre of gravity of the device or holding head, with respect to the axis of the wire, so that the head tilts together with the load. This position is particularly disadvantageous when the object which is loaded must be kept in a horizontal position, as for example in the above mentioned case of the transport of reels, which must be loaded horizontally on spinning machines, weaving machines and the like. In order to overcome this problem it has been suggested to equip the holding head and the lower end of the wire with an arm each, these arms being superimposed and engaged with one another in a shiftable manner by means of an electric motor. When the device, or holding head, is tilted because of the presence of the load, the operator will control the reciprocal translation of the two arms to bring back the centre of gravity of the device and load into alignment with the wire. However, this solution is costly, and it is not very practical.

Other well known problems of the known holding devices are caused by the need to ensure that reels or tubular elements are safely fastened to the fastening mandrel of the device, and also the need to ensure an equally safe and easy release of the load from the mandrel, once the load has been positioned on its final support. This problem is particularly important in that bobbins are often lifted from a vertical starting position and then brought to a horizontal position.

An object of the present invention is to solve the above mentioned problems by means of a holding device for weight zeroing devices, wherein it is possible to keep even lateral loads in a horizontal position and to ensure a good fastening to the same.

This object is reached by the present invention, which concerns a load holding device for a balancing unit, of the type comprising means for balancing, in the presence of a load, the load centre of gravity with respect to the wire suspending said balancing unit, characterized in that said means include a first element which is integral with said device and is positioned at a slant with reference to the vertical axis thereof; and a second element which is fixed to the lower end of the wire and axially shift with reference to said first element, said first and second elements being fixed to each other by elastic means which push them in a retracted position.

According to a preferential aspect of the invention, the above mentioned elements are of a tubular shape and are lodged coaxially, one inside the other. According to another aspect of the invention, the device also includes a load fastening mandrel, provided with one or more mobile self-blocking elements, which can be moved between a protruding position and a retracted position, with respect to the surface of said mandrel; means elastic for pushing these mobile elements into a protruding or a retracted position; and contrast elements to bring these elements, against the pushing action of said elastic means, into a retracted or a protruding position, respectively.

The self blocking elements are preferably formed by knurled pawls eccentrically assembled and normally kept in a protruding position, and the contrast elements are formed by a small piston activated by an electromagnet.

According to another aspect of the invention, the mandrel is assembled in a movable and replaceable manner on the holding device, and a plurality of mandrels is provided, with different external diameters and the same internal diameter, which can be detachably mounted on the device depending on the diameter of the loads that must be moved.

According to another preferential aspect, the invention foresees that the device comprises a first portion which includes the mentioned tubular balancing elements, and a second portion which includes the mentioned fastening mandrel, said second portion being assembled on the first one and being imperniated thereon in such a manner to be able rotated with respect to the same, from a to a mandrel horizontal position to a mandrel vertical position and viceversa.

The invention will be now described more in detail, with reference to the attached drawings, given for illustrative and not limiting purposes, wherein:

- figures 1 and 3 are a longitudinal cross-sectional view of the device according to the invention, and
- figure 2 is an enlarged view of a self-blocking fixing element.

In the preferred embodiment, illustrated in figure 1, the load holding device according to the invention includes a casing 1, that is fixed to a suspension wire 2, and provided on the upper part thereof with means 3 to balance the centre of gravity of the device in the presence of a load on

the mandrel 4.

The means 3 include a first element 5, that is integral with the casing 1, and is fixed in a slanting position with respect to the vertical axis of the device, and a second element 6, that pivots in 8 on a flange 7 that is integral with the suspension cable 2. The second element 6 can axially slide with reference to the first element and it is joined to it by a spring 9, or a similar elastic means which keeps the two elements 5 and 6 in a retracted position, i.e. a position in which the two elements at least partially overlapping. The slanting angle with respect to the vertical of the elements 5 and 6 is generally between 40 and 50 degrees and is preferably approximately 45 degrees.

Elements 5 and 6 are preferably of a tubular shape and, as illustrated in figure 1, element 6 is housed coaxially inside the first element 5 and engages the same by means of bushes 10 in a material having a low friction coefficient, such as Glycodur (registered trademark).

As it may be seen in figure 1, the spring 9 connects the upper end of element 6, with the base of element 5, where a screw 11 is also present, into engagement with a connection 11a to which spring 9 is fixed, in order carry-out a fine calibration of said spring. In turn, the spring 9 is chosen according to the strength which will be applied on it by the load 12, in order to counterbalance this force and realign the centre of gravity of the device and load with the wire 2. Preferably, the choice and the calibration of the spring are such to obtain the required equilibrium condition when the element 6 is at the end of its stroke, as illustrated in figure 3.

The operation of the mechanical means 3 is completely automatic: once the load is positioned on the fastening mandrel 4, the load weight will make the elements 5 and 6 to translate with one another, thus leading to a new-equilibrium of the centre of gravity.

In order to obtain a sure fastening of the load 12 on the mandrel 4, the mandrel is provided with one or more self-blocking elements 13, mobile between a protruding position with respect to the mandrel surface mandrel in which the load 12 is engaged, and a retracted position in which the load is disengaged. The elements 13 are provided in a known manner with elastic means 14, such as springs or the like elements, which maintain these elements in a normally protruding position (or alternatively in a normally retracted position). As the elements 13 are self-blocking, in order to bring them into a retracted position and allow to releasing of the loading device, contrast means are provided in order to overcome the action of the springs 14 and bring on command the elements 13 in the required position.

Of course, if the springs 14 push the elements 13, in a normally retracted position, the contrast means will operate in the inverse direction.

Figure 2 illustrates a preferred embodiment of the elements 13 and their control system.

In this case the elements 13 comprise three knurled pawls mounted in an eccentric position to obtain the required self-blocking in the direction indicated by the arrow F in figure 2 and rotatable in the direction of arrow G (Figure 2). The springs 14 push the pawls 13 towards their normally protruding position with respect to the mandrel 4, and a mobile contrast element 15, which is controlled by a small piston or an electromagnet 15a, brings them back into their retracted position when required.

Said the pawls 13, or like, technically equivalent means, allow to safely fix the load 12 to the mandrel 4. This is particularly useful in the embodiment of the device of the invention as shown in figure 1. In this example, in fact, the device of the invention comprises two portions that pivot between each other at 16. The upper portion includes the balancing elements 5 and 6, while the lower portion includes the mandrel 4 and the handle 17, and can be rotated around the articulated joint 16, from a horizontal mandrel position, as illustrated in figure 1, to a vertical mandrel position (not shown), and viceversa. This movement allows to fasten to the device reels or other loads which are initially in a vertical position, in order to bring them in a horizontal position.

The mandrel shown in figures 1 and 2 is a cylinder shaped type and is used to move reels, or in general loads which can be engaged with tubular elements.

The mandrel 4 is assembled in a detachable position, as for example by a bayonet lock, on the casing 1 of the device according to the invention, so that it can be replaced when necessary with other mandrels having different outer diameters but an identical inner diameter and an identical assembling system onto the casing.

Near the mandrel 4, a sensor is provided that indicates to the balancing unit the presence of a load 18 on the holding device.

The shown preferred embodiment further has an indicator of the position of load 19, for example a photocells or a similar monitoring device, to indicate when the load has been deposited on the final stand, i.e. when the load transport is over.

The indicator 19 is preferably connected to the electromagnet 15a that controls the element 15 and activates the same to unblock the the pawls 13.

During operation, first load 12 is taken by the mandrel 4 and the self blocking elements 13, in case with a rotation of the device lower part around the articulated joint 16. Then, the elements 5 and 6

translate with one another and balance the centre of gravity of the load plus the device, so as to keep the load 12 substantially horizontal. The sensor 18 monitors the presence of the load and communicates the same to the electronic part of the balancing equipment which effects the zeroing operation of the load weight.

Once the load has been taken to its final stand, the elements 13 are unblocked, by means of a manual control or due to am indication of sensor 19, after which the holding device is freed from its load. Elements 5 and 6 automatically return to a retracted position, due to the action of spring 9, and the device is therefore ready to collect a new load.

Claims

1. A load holding device in a balancing unit, of the type including means for balancing the centre of gravity of the device with respect to a suspending wire fors said unit in the presence of a load, characterized in that said balancing means comprise a first element that is integral with said device and is positioned at a slant with reference to the vertical axis of the same, and a second element that is fixed to the lower end of said wire and axially slides with reference to said first tubular element, said first and second elements being connected to one another by elastic means that push them in a retracted position.

2. A device according to Claim 1, characterized in that said elements are slanted by an angle between 40 and 50 degrees with respect to the vertical axis of said device.

3. A device according to Claim 1 or 2, characterized in that said first and second elements are tubular elements and in that said second element is coaxially housed inside said first element.

4. A device according to Claim 1, characterized in that it comprises: a load fastening mandrel having one or more self-blocking elements that are mobile between a protruding position and a retracted position with respect to the surface of said mandrel; elastic means to push mobile elements in their protruding or retracted position; and contrast means to operate against said elastic means in order to bring the same in their retracted or a protruding position, respectively.

5. A device according to Claim 4, characterized in that said self blocking elements are in the form of knurled pawls mounted in an eccentric position and generally pushed towards their protruding position, and in that said contrast means generally comprise a small piston or an electromagnet.

6. A device according to Claim 4, characterized in that said mandrel is assembled in a detachable and replaceable manner on said device.

7. A device according to Claim 4, characterized in that it comprises at least one sensor to detect the presence of the load.

8. A device according to Claim 4, characterized in that it comprises one or more sensors for the positioning of the load, said sensors being connected to control means for said contrast means, in order to control an automatic release of the load.

9. A device according to any one of the preceding claims, characterized in that it comprises of a first portion having said balancing elements and a second portion having said fastening mandrel, said second portion being pivotably mounted on said first portion and being rotatable with respect to the same from a horizontal mandrel position to a vertical mandrel position, or viceversa.

10. A device according to Claim 6, characterized in that it comprises a plurality of mandrels with different outer diameters and the same inner diameter, said mandrels being able to be detachably assembled on said device.

11. A balancing unit characterized in that it includes a device according to one of the claims 1 to 10.

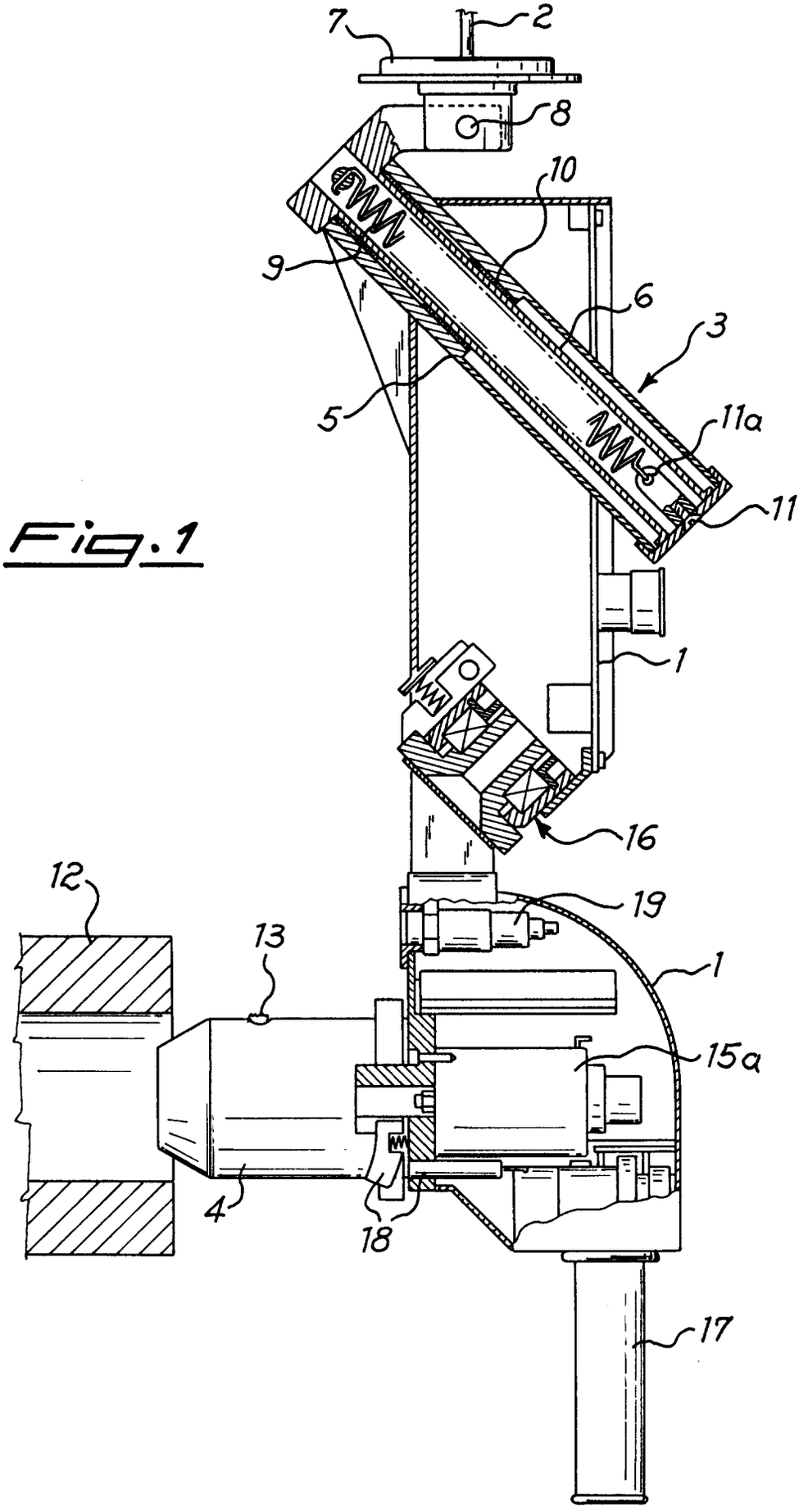

Fig.1

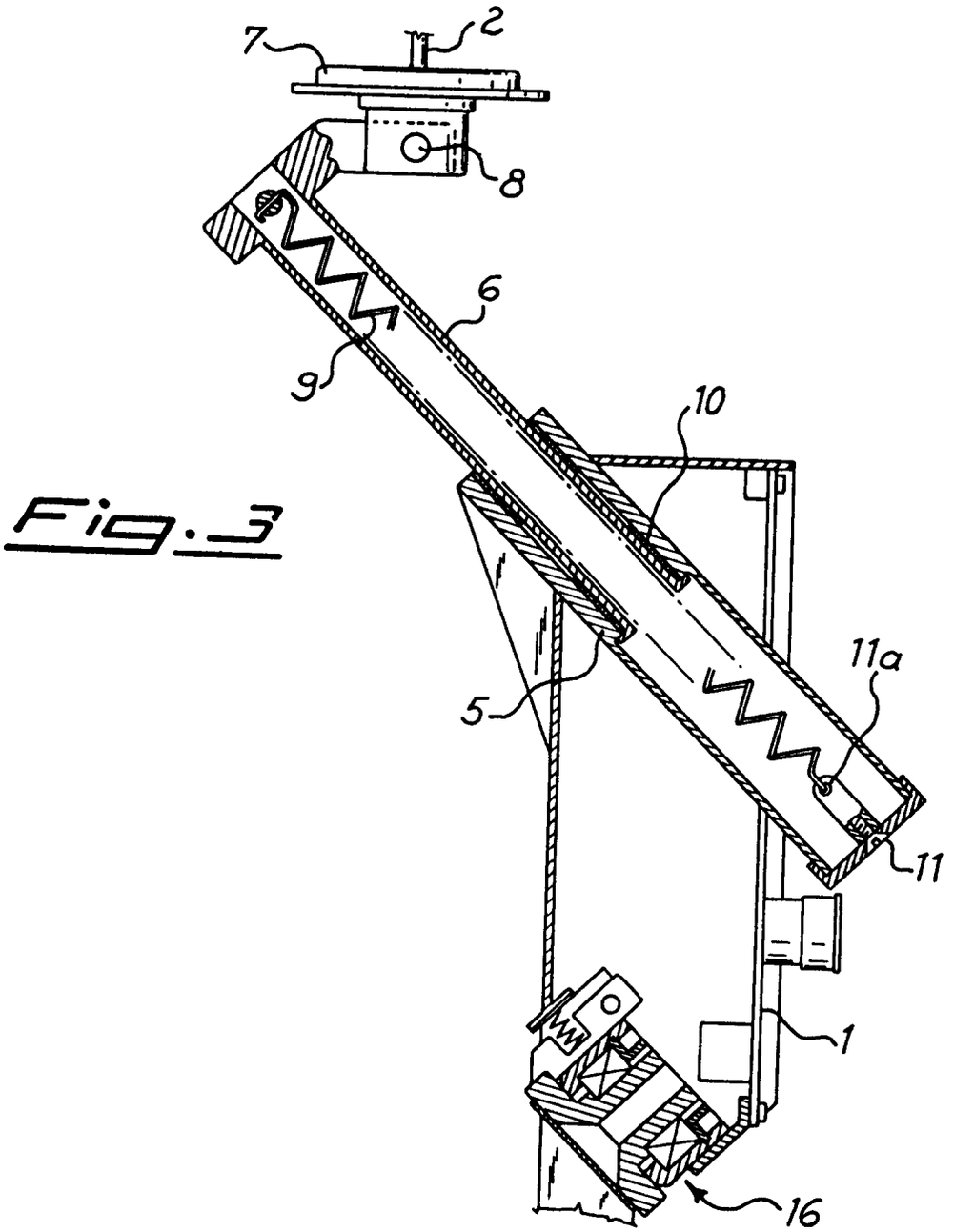

Fig.3

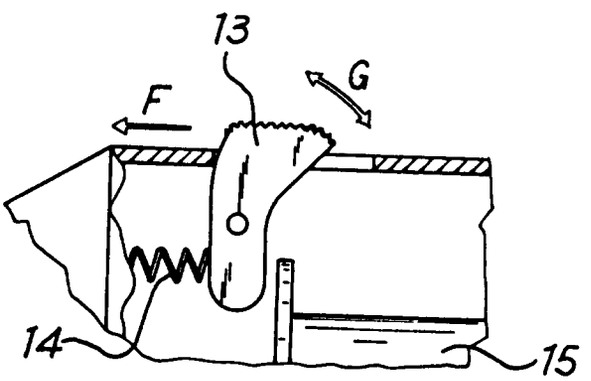

Fig.2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 93 10 6461

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.5)
X Y	DE-U-8 814 900 (D. LEMM) * page 6, line 21 - page 7, line 10 *	1-3,11 4-10	B66C1/24 B66C1/54 B65H67/06
Y	DE-A-3 341 351 (A. QUAAS) * page 19, line 12 - page 20, line 16 * * page 25, line 22 - page 26, line 34 * * page 28, line 1 - page 29, line 22 *	7,8	
Y	US-A-4 708 574 (S.J. CONBOY; R.J. KISH) * column 4, line 38 - line 49; figure 7 *	4-6,9,10	
A	FR-A-2 125 218 (P. CHASTAGNER)		
A	FR-A-1 259 385 (BRIQUETERIE DE BREUIL)		
A	CH-A-578 480 (O. STIERLI)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)
B66C B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	19 AUGUST 1993	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

EPO FORM 1503 03.82 (P0401)