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### (54) Wrapping apparatus equipped with a column temporarily foldable for transport

(57) A self-propelled wrapping apparatus is disclosed, said apparatus being of the type having a self-propelled chassis (1) on which a column (3) for displace-

ment of a reel-support bracket (4) is mounted, said column (3) being divided vertically into two portions, i.e. a top portion (3a) and a bottom portion (3b), between which hinging means (C) are arranged.

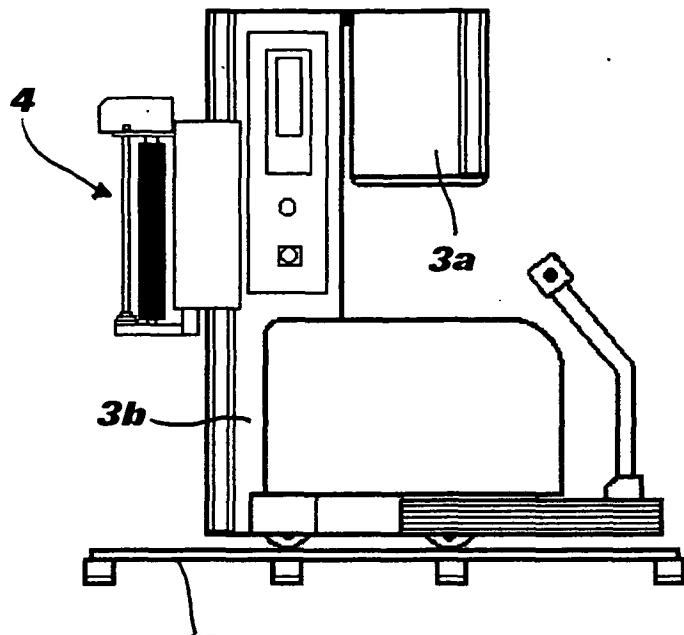


FIG.3

## Description

**[0001]** The present invention relates to a self-propelled wrapping apparatus, the volume of which can be reduced temporarily for transportation purposes.

**[0002]** In the field of industrial wrapping apparatus, in particular for wrapping with shrinkable film loads resting on pallets, for some time small automatic self-propelled vehicles have existed.

**[0003]** These vehicles, for example such as that described in the Utility Model Application MI02U000205 in the name of the present Applicants, are commonly formed by a self-propelled chassis equipped with a column on which a reel-support bracket is made to move vertically, said reel supplying shrinkable plastic film. The vehicle is also equipped with a feeler arm which has a suitable appendage and is suitably attached to the steering of the vehicle so as to cause the latter to follow, during travel, the perimeter of the load to be packaged. In particular, the feeler arm is connected to the steering system of the apparatus and, moving in contact with the pallet, is able to steer the vehicle when, at a corner of the load, there is an interruption in the contact surface. In this way, once started-up, the self-propelled apparatus is able to follow independently the contour of the load, at the same time wrapping it with a shrinkable packaging film.

**[0004]** This robot, unlike similar more conventional pallet-wrapping apparatus (for example of the rotating-platform or rotating-arm type), has a base frame of fairly small dimensions, normally sufficient to house the driving system with the associated electric battery and electronic control system.

**[0005]** The column for raising and lowering the reel is also accommodated on the same frame, said column having relatively small dimensions in plan view (for example 300x300 mm), but a considerable height. Therefore the biggest dimension of the robot is in the vertical direction and is due precisely to the column.

**[0006]** Although this dimension does not cause any problems during operation, complications arise when it is required to prepare the apparatus for packaging and transportation. In fact, if it were not for this tall column, the packaging case could be of a very small size, in keeping with standard shapes which allow more efficient transportation also in terms of costs.

**[0007]** Therefore, usually the column is inserted into the packaging case separate from the chassis of the self-propelled device, for example being laid horizontally alongside the chassis. However, in so doing, there are still certain constructional limitations to which the column is subject, since it must in any case have a height of less than about 2000 mm, otherwise the packaging would be excessively long in terms of its plan dimensions.

**[0008]** In any case, for the purposes of packaging, the column is completely disassembled from its base provided on the self-propelled device. Therefore the end

user, upon receiving the packaging, is obliged to assembly accurately on their own the column together with the associated wiring which connect it to the driving and power supply compartment. The end user is not always

5 keen to perform this operation since it may result in assembly errors which could damage operation of the apparatus.

**[0009]** Moreover, if the end user should decide to move the robot, loading it on a transportation vehicle, 10 they would then have to perform again disassembly and reassembly of the column, this operation requiring a certain amount of expertise and time.

**[0010]** The Applicants have therefore set themselves 15 the task of considering and solving these problems by providing a self-propelled wrapping apparatus, the volume of which can be easily reduced, at least during transportation, and which can be restored with equal ease to its operating condition by the end user.

**[0011]** This object is achieved by means of an apparatus 20 as described in the accompanying claims.

**[0012]** Further characteristic features and advantages 25 of the apparatus according to the invention will, however, emerge more clearly from the following detailed description, provided by way of example and illustrated in the accompanying drawings, in which:

Fig. 1 is a side elevation view of the apparatus according to the invention;

30 Fig. 2 is an enlarged view of a detail of the pivoting column;

Fig. 3 is a view similar to that of Fig. 1 in which the apparatus is ready for packaging;

Figs. 4A and 4B are a side elevation view and front view of an exemplary of packaging.

35 **[0013]** A self-propelled wrapping apparatus is composed, in a manner known per se, of a self-propelled chassis 1 on which a housing 2 containing the drive system and the power supply unit is provided. A column 3 comprising a system for vertically guiding and displacing a reel-support bracket 4 is also mounted on the self-propelled chassis 1.

**[0014]** According to the invention, the column 3 has a 40 top portion 3a which is hinged, by means of hinging means C, with respect to a bottom portion 3b.

**[0015]** In this way, the top portion 3a is able to rotate 45 about the hinging means C, being folded down alongside the bottom portion 3b (as shown in broken lines in Fig. 1).

**[0016]** In addition to the hinging means C, other guiding means 5 may be envisaged, said means being for example in the form of locating plates, on the top end of the bottom portion 3b, which are able to guide and keep the top portion 3a stably aligned with the bottom portion 55 3b. In this way, the folding-down movement and, vice versa, restoration of the continuity of the column may be performed several times with a high degree of repeatability and precision, without adversely affecting the

alignment of the elements for guiding and displacing the bracket 4.

**[0017]** Moreover, tightening means are envisaged (not shown), said means being able to lock the top column portion 3a in an upright position (shown in continuous lines in Fig. 1).

**[0018]** Advantageously, the hinging means, and therefore the line joining together the top portion 3a and the bottom portion 3b, are arranged above a control panel P if present. By so doing, the wiring remains housed completely within the bottom portion and there is no need to perform any corrective adjustment thereof during folding or realignment of the column.

**[0019]** An apparatus provided with a column which can be partially and temporarily folded-down is therefore provided, thus achieving all the desired objects.

**[0020]** The top portion 3a may in fact be folded down alongside the bottom portion 3b, greatly reducing the vertical volume of the apparatus. The type of hinging system and its location are also particularly advantageous in that they avoid complications, even for the least expert user, during folding-down or restoration of the operating condition, said operations being able to be performed easily and rapidly even many times during the working life of the apparatus.

**[0021]** It is also possible to take further advantage from the folding column according to the invention, in that a greater height may be provided (resulting in an advantage when wrapping special loads) without having to worry about the production, packaging and transportation stages. A height which may be contemplated without any problem is, for example, 2500 mm.

**[0022]** Fig. 3 shows the apparatus ready for packaging. It should be noted that the peripheral volume of the packaging case 10 is extremely small.

**[0023]** It must be pointed out, moreover, that during development of this original solution, which is so advantageous from various points of view, the Applicants have actually also overcome a technical prejudice, having had the courage to identify a disruptive solution for a component, such as the displacement column, considered hitherto untouchable in terms of its structure.

**[0024]** It is understood, however, that scope of the invention described above is not limited to the particular embodiment shown, but is extended to any other constructional variant which achieves the same usefulness.

## Claims

1. Self-propelled wrapping apparatus, of the type having a self-propelled chassis on which a column for displacement of a reel-support bracket is mounted, **characterized in that** said column is divided vertically into two portions, a top portion and a bottom portion, between which hinging means are arranged such that said top portion can be folded-down, reducing temporarily the overall height of the

column.

2. Apparatus as claimed in Claim 1), in which said hinging means are arranged so that said top portion may be folded-down alongside the bottom portion.

3. Apparatus as claimed in Claim 1) or 2), in which guiding and locating means are also provided between said top portion and bottom portion so as to ensure repeatability in the alignment between the two portions upon repeated folding-down and realignment of the top portion, and stably fixing of the column in its realigned condition.

15 4. Apparatus as claimed in Claim 1), 2) or 3), in which said column has an overall height greater than 2000 mm and said bottom portion does not exceed 1800 mm.

20 5. Apparatus as claimed in any one of the preceding claims, in which said hinging means are arranged so that separation between said top portion and said bottom portion is performed above any control panels which may be mounted on the column.

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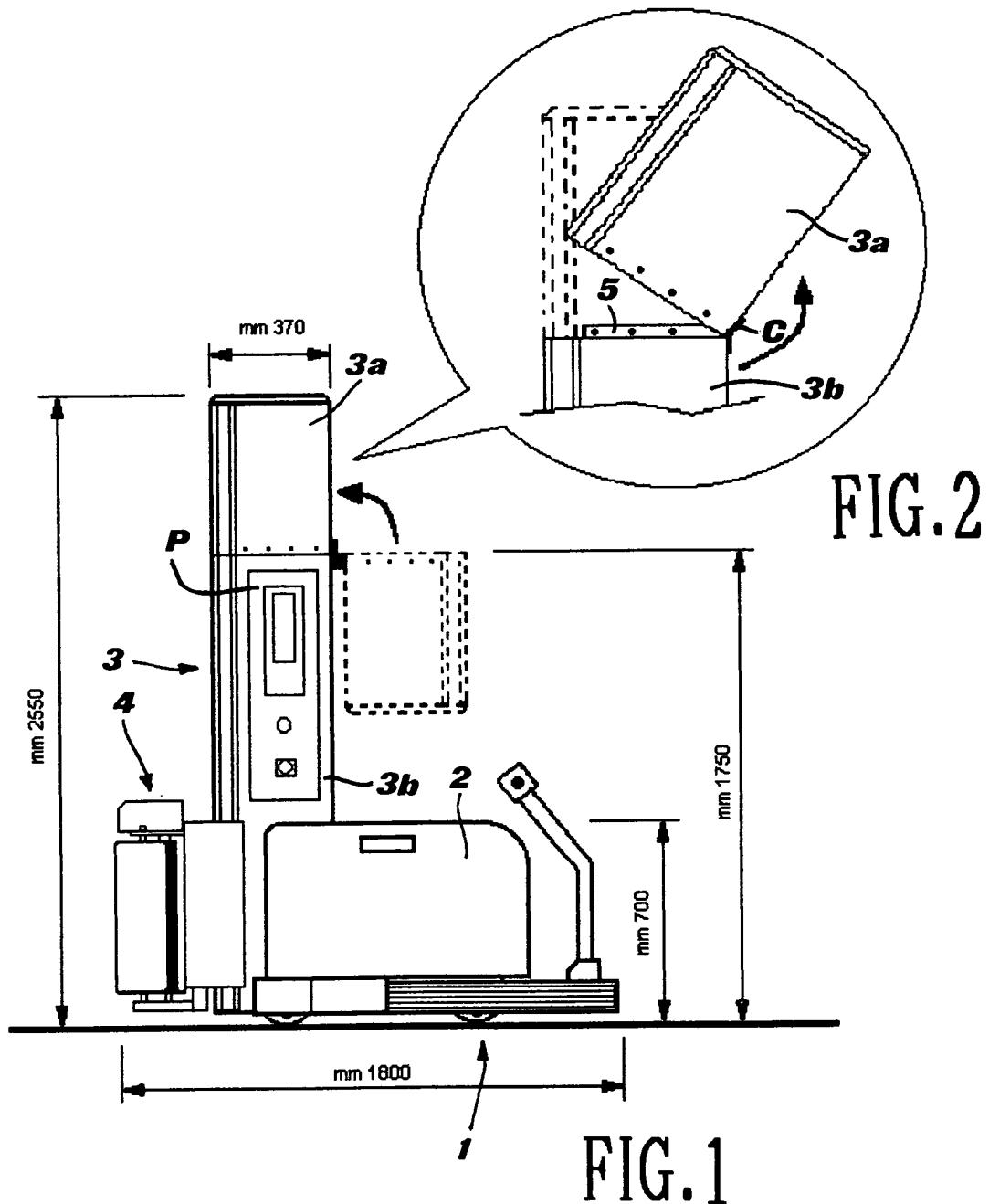
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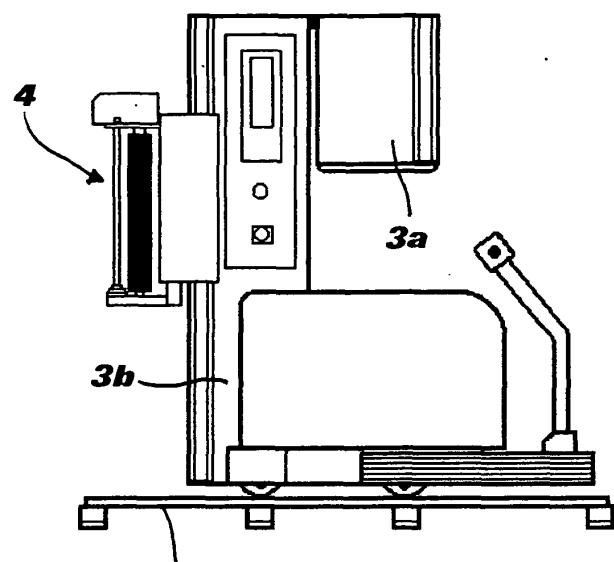


FIG.3

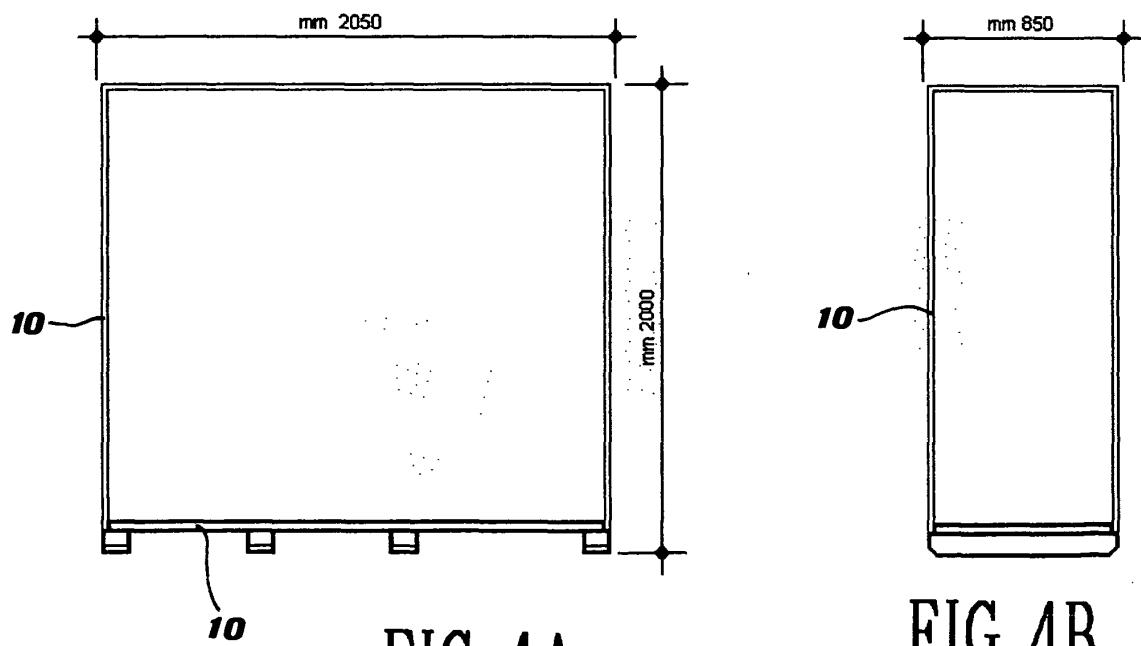


FIG.4A

FIG.4B



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## EUROPEAN SEARCH REPORT

Application Number  
EP 03 10 2197

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim							
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)						
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<p>The present search report has been drawn up for all claims</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Place of search</td> <td style="width: 33%;">Date of completion of the search</td> <td style="width: 34%;">Examiner</td> </tr> <tr> <td>THE HAGUE</td> <td>6 November 2003</td> <td>Jagusiak, A</td> </tr> </table>				Place of search	Date of completion of the search	Examiner	THE HAGUE	6 November 2003	Jagusiak, A
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CATEGORY OF CITED DOCUMENTS		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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ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.

EP 03 10 2197

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