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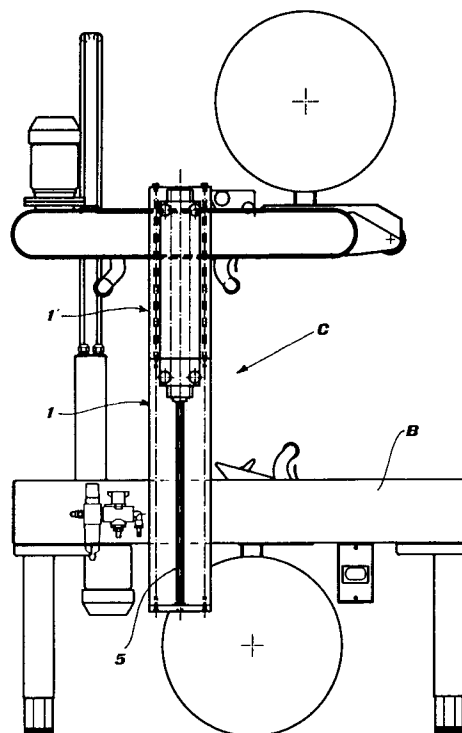
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D-80801 München (DE)(54) **Support structure for the taping head in packaging machines**

(57) A support column, particularly designed to form one of the lateral uprights for slidably supporting the upper taping head of a packaging machine, comprises a fixed lower body anchored to the machine bed and a vertically slidable upper body guided with no slack into said fixed lower body, as well as a cylinder and piston unit to control said sliding. According to the invention, said fixed lower body is formed as a guide element (1) consisting of a channel section opening towards the centre of the machine bed (B), and said slidable upper body is formed as a slide element (2) consisting of a substantially rectangular section with a circular hollow central portion, a piston-rod unit cooperating with said hollow portion acting as a cylinder (2a) so as to form said control unit.

**FIG.2****EP 0 686 560 A1**

As known, packaging machines of the type meant to apply an adhesive sealing tape onto the lower and upper surfaces of packing boxes - particularly cardboard boxes - have a structure which comprises, at the lower side, a bed equipped with means to move forward the packing boxes and with a fixed lower taping head, and at the upper side, a crosspiece to support an upper taping head, adjustable in height.

To allow handling boxes of different heights the crosspiece supporting the upper taping head is in fact movable and adjustable in height. For this purpose, said crosspiece is supported at the upper ends of two columns fixed to the opposite sides of the machine, said columns being formed as telescopic uprights.

More precisely, each of the two columns is formed of a first fixed lower guide element and of a second upper element sliding telescopically into the first, both elements having the configuration of tubular bodies with a generally quadrangular section. The sections of these bodies are dimensioned so that the second element can be mounted axially slidable into the first, preferably with the interposition of rolling means. This telescopic column structure has dimensions such as to be able to stand the stresses, both vertical and transversal, determined by the operation of the upper taping head fixed at the upper side of the second slidable element of the column.

To control the vertical movements of the slidable element, a driving cylinder is housed inside each column, with its body anchored to the fixed guide element and its movable rod anchored to the sliding element. Said driving cylinder is capable of supporting axial loads, but no transversal load, its movable rod being relatively thin and scarcely guided in a transversal sense.

Said structure - though working perfectly and being normally adopted on packaging machines of this type - is however quite complicated and costly. It in fact requires - on one hand - a self-supporting telescopic structure, with two elements sliding into each other, and - on the other hand - a separate operating system comprising a cylinder and piston unit; the costs are thereby doubled. Besides, a structure of this type is quite bulky, since - in conditions of maximum height of the column, that is, with the telescopic body fully drawn out - this latter should still be housed into the fixed body to an extent sufficient to guarantee its correct support against transversal stresses. Thus, the whole telescopic column structure has considerable overall dimensions even in conditions of minimum length.

To at least partly solve these problems and, in particular, to reduce the costs of such a structure, it has recently been proposed - in the Italian Patent application MI93A 002134, filed on 7.10.1993 - to

adopt a telescopic column structure wherein the lower fixed guide element is formed as an extruded section having at least a central cylindrical hollow portion, apt to form also the body of a driving cylinder, while the upper sliding element consists of a cylindrical body, slidable with minimum slack into said cylindrical hollow portion of the extruded section. Hence, in practice, the two telescopic elements of the column form, at the same time, the cylinder and piston unit of the operating means.

It should be noted at once that, for the correct working of this telescopic column structure, it is first of all essential for the cylindrical hollow portion of the section - forming the lower fixed guide element - and for the cylindrical body sliding therein, to both have a cross section which is sufficiently wide - for instance with a diameter of 50 to 60 mm - to guarantee the required transversal, as well as axial, resistance.

Said arrangement has however two kinds of drawbacks:

- on one hand, in spite of adopting, as said, diameters of 50 to 60 mm, the transversal resistance of the column turns out to be insufficient when the upper sliding element is fully drawn out and when the taping head is heavy enough to produce higher stresses;
- on the other hand, the cost of special extruded sections, having a cylindrical hollow portion of wide diameter, is so high as to at least partly reduce the advantage of not using a separate cylinder and piston unit.

The object of the present invention is to thus propose a column structure to slidably support the upper taping head of a packaging machine, said structure being improved in respect of those described heretofore, and particularly more economic as far as construction and use, as well as more compact as far as length and, in spite of this, more resisting to transversal stresses.

These objects are reached with a support column, of the type comprising a fixed lower body anchored to the machine bed and a vertically slidable upper body guided with no slack into said fixed lower body, as well as a cylinder and piston unit to control said sliding, essentially due to the fact that said fixed lower body is formed as a guide element consisting of a channel section opening towards the centre of the machine bed, that said slidable upper body is formed as a slide element consisting of a substantially rectangular section with a circular hollow central portion, and that a piston-rod unit cooperates with said hollow portion acting as a cylinder so as to form said control unit.

Further characteristics and advantages of the column structure according to the present invention will anyhow be more evident from the following detailed description of a preferred embodiment

thereof, given by way of example and illustrated on the accompanying drawings, in which:

Fig. 1 is a horizontal cross section view of a support column according to the present invention; and

Figs. 2 and 3 are diagrammatic side views of a packaging machine equipped with a support column according to the invention, in conditions of use - with the taping head at maximum height - and, respectively, in rest (or transport) conditions.

As clearly shown in the cross section view of fig. 1, the support column of the present invention fundamentally consists of two elements: a fixed guide element 1 and a slide element 2 sliding into the guide 1. Both elements are preferably formed starting from extruded aluminium sections.

The fixed guide element 1 has an overall channel section: its outer surface is substantially smooth, while its inner surface comprises recesses 1a and 1b, apt to form guiding and sliding grooves. Further recesses 1c are formed into the edges of the channel, to house anchor means - not shown, as forming part of known technique - for fixing the guide element 1 onto the sides of the machine bed B; said fixing is in fact obtained by positioning the channel section with its open part facing the inside of the machine bed, for the purpose clearly described hereinafter.

Into the channel section 1 there is slidably mounted - as said - the slide element 2. According to the fundamental characteristic of the present invention, said element 2 has a generally rectangular cross section, but with the central portion forming a hollow cylinder 2a. The rectangular contour of said element 2 comprises recesses 2b, 2c and 2d, in the form of grooves extending throughout its length: the recesses 2b and 2c are used for housing blocks 3a and 4a apt to support guide rollers 3 and 4 respectively, while the recesses 2d are apt to house means of anchorage (not shown) to the upper taping head N2.

The rollers 3 are slidable into the grooves 1a of the fixed guide element 1 and they ensure - by bearing against opposed sliding surfaces - the retention of the slide element 2 in the sense of the double arrow F. The rollers 4 are in turn slidable into the grooves 1b of the element 1 and they ensure the retention of the slide 2 in the sense of the double arrow F'.

According to the fundamental characteristic of the present invention, the cylindrical hollow portion 2a of the slide 2 forms the sliding seat for a driving piston (not shown in detail, but the rod 5 of which can be seen in figs. 2 and 3).

Thanks to the aforescribed arrangement - wherein the crosswise support of the slide element 2 is ensured by sliding of the rollers 3 and 4 into

the grooves 1a and 1b - the cited piston merely has to perform the driving function. For this purpose, as clearly shown in the drawings, the lower end of its rod 5 is anchored to the base of the fixed guide element 1, thus being in turn fixed; while it is the cylindrical body 2a, or the whole slide element 2, which - when feeding or alternatively discharging the pressure into said body 2a - moves vertical-wise, up and respectively down. As can be understood, the arrangement is inverted compared to the normal working of a piston and cylinder unit.

As can also be understood, the piston - having to stand only axial efforts - can have a far smaller cross section, for instance a diameter of only 30 mm, and even a reduced axial length, for instance also of 20 or 30 mm; likewise, the rod 5 can have a reduced section, for instance a diameter of only 20 mm. In practice, this makes it possible to use a piston-rod unit of the commercial type, and thus of reduced cost.

The structure according to the present invention therefore allows to obtain a first important advantage, compared to both the structures of known technique described further above, namely a reduction of costs: in fact - on one hand - use is made only of the piston-rod unit, and not also of the body of a commercial-type cylinder, and - on the other hand - the extruded section forming the slide 2 is more economical, having a cylindrical body 2a of standard reduced dimensions.

As diagrammatically shown in figs. 2 and 3, a packaging machine - of the type of those to which the invention refers - comprises a pair of support columns C, whose fixed guide element 1 is steadily anchored to the sides of the machine bed B. As already mentioned, the element 1 is anchored to the side of the bed with its channel section opening towards the centre of said bed; in this way, the element 1 practically forms an open guide, into which the element 2 is apt to move like a slide, always housed into the guide 1. In other words, it is no longer necessary for the slidable element 2 to telescopically slide out from the top of the fixed element 1 - in order to support the taping head N2 - since, in any position along the guide 1, said slide element 2 always has an accessible point of anchorage for the upper taping head N2.

A second and most important advantage is thus obtained with the structure according to the present invention - which is more compact and provides a more reliable guiding action - in that:

- on one hand, the slide element 2, even if of limited axial dimensions, is always perfectly guided and supported into the fixed guide element 1, for instance through the pairs of rollers 3 and 4 provided at its two ends; and
- on the other hand, the whole column assembly can be made more compact: in fact, the

length of the slide element 2 should correspond only to its working stroke, and need not be increased by a portion having merely a guiding function into the fixed element 1, as it happens in the known telescopic-type structures.

As diagrammatically shown in figs. 2 and 3, on the machine bed B there are mounted a first belt conveyor, with respective driving motor M1, and a lower taping head N1 (only shown in part on the drawing). On the top of the slide element 2 there is moreover mounted an upper operating unit, comprising in turn a belt conveyor, with respective driving motor M2, and an upper taping head N2. Fig. 2 illustrates said upper unit in a working position, at maximum height in respect of the machine bed B, while fig. 3 shows said unit in a position of minimum height in respect of the bed B, that is, of minimum dimensions and ready for transport, as better specified hereinafter.

Figs. 2 and 3 clearly evidence an even further advantage provided by the column structure of the present invention, namely that it allows to reduce the height of the machine in non-working conditions, that is, in view of its transport. In fact, the fixed guide element can be formed in two joined parts 1 and 1', so that:

- in working conditions, the second part 1' - of suitable length (as shown in fig. 2) - forming an upward extension of the first fixed part 1 of the guide element, remains joined to this latter, so as to reach the maximum desired height of the column C; whereas,
- in rest conditions, for transport, only the first fixed part 1 of said guide element remains anchored to the side of the machine bed B (as shown in fig. 3) - said part 1 being of very reduced length, just sufficient to house the slide element 2 in a fully lowered position - while the second part 1' can be removed from the first part 1 and temporarily laid flat.

Finally, a still further advantage of the structure according to the present invention - at least in respect of the arrangement proposed by the cited Italian Patent application MI93A 002134 - derives from the use of a cylinder 2a of small diameter. Taking into account that it is a single-acting cylinder and that it is operated with compressed air, it is evident that a smaller section of the cylindrical body also involves less consumption of compressed air and, therefore, less operating costs.

It is anyhow understood that the protection scope of the present invention is not limited to the embodiment thereof described heretofore, but can be extended to any other technically equivalent constructive variants.

Claims

1. Support column, particularly designed to form one of the lateral uprights for slidably supporting the upper taping head of a packaging machine, of the type comprising a fixed lower body anchored to the machine bed and a vertically slidable upper body guided with no slack into said fixed lower body, as well as a cylinder and piston unit to control said sliding, characterized in that said fixed lower body is formed as a guide element (1) consisting of a channel section opening towards the centre of the machine bed (B), in that said slidable upper body is formed as a slide element (2) consisting of a substantially rectangular section with a circular hollow central portion, and in that a piston-rod unit cooperates with said hollow portion acting as a cylinder (2a) so as to form said control unit.
2. Support column as in claim 1), wherein said piston-rod unit is mounted fixed, with the lower end of its rod (5) anchored to the base of the fixed guide element (1), and said hollow portion acting as a cylinder (2a) is mounted slidable in respect of the piston-rod unit.
3. Support column as in claim 1), wherein said hollow portion of the slide element (2) acting as a cylinder (2a) and the piston of said piston-rod unit have a reduced cross section, for instance a diameter of less than 30 mm.
4. Support column as in claim 1), wherein said fixed guide element (1) has a length sufficient to completely house said slide element (2), in its travel from the lowest to the highest position.
5. Support column as in claim 4), wherein said fixed guide element is formed in two parts, a first lower fixed part (1) of length substantially corresponding to the length of said slide element (2) and a second part (1'), removable from the first part (1) and forming an upward extension thereof, of length substantially corresponding to the working stroke of said slide element (2).
6. Support column as in claim 1) or 4), wherein the outer surfaces of said slide element (2) carry guide rollers (3, 4), mounted freely rotating about axes perpendicular one to the other and in respect of the sliding axis of the slide element (2), and the inner surfaces of said fixed guide element (1) are provided with axial grooves (1a, 1b) forming rolling guides for said

rollers (3, 4).

7. Support column as in claim 6), wherein said fixed guide element (1) and said slide element (2) comprise, on their side facing the centre of the machine bed (B), recesses (1c, 2d) to house means of anchorage to the side of the machine bed (B) and, respectively, to the side of the upper taping head (N2).
8. Support column as in claim 7), wherein said recesses (1c, 2d) are in the form of grooves extending throughout the length of said guide (1) and slide (2) elements.
9. Support column as in any one of the previous claims, wherein said guide (1) and slide (2) elements are formed from extruded aluminium sections.
10. Extruded aluminium section to form the slidable slide portion (2) of a support column (C) as in any one of the previous claims, characterized in that its cross section has an essentially quadrangular outer contour and a circular inner contour, this latter being apt to define the cylindrical body (2a) of a cylinder-piston control unit.

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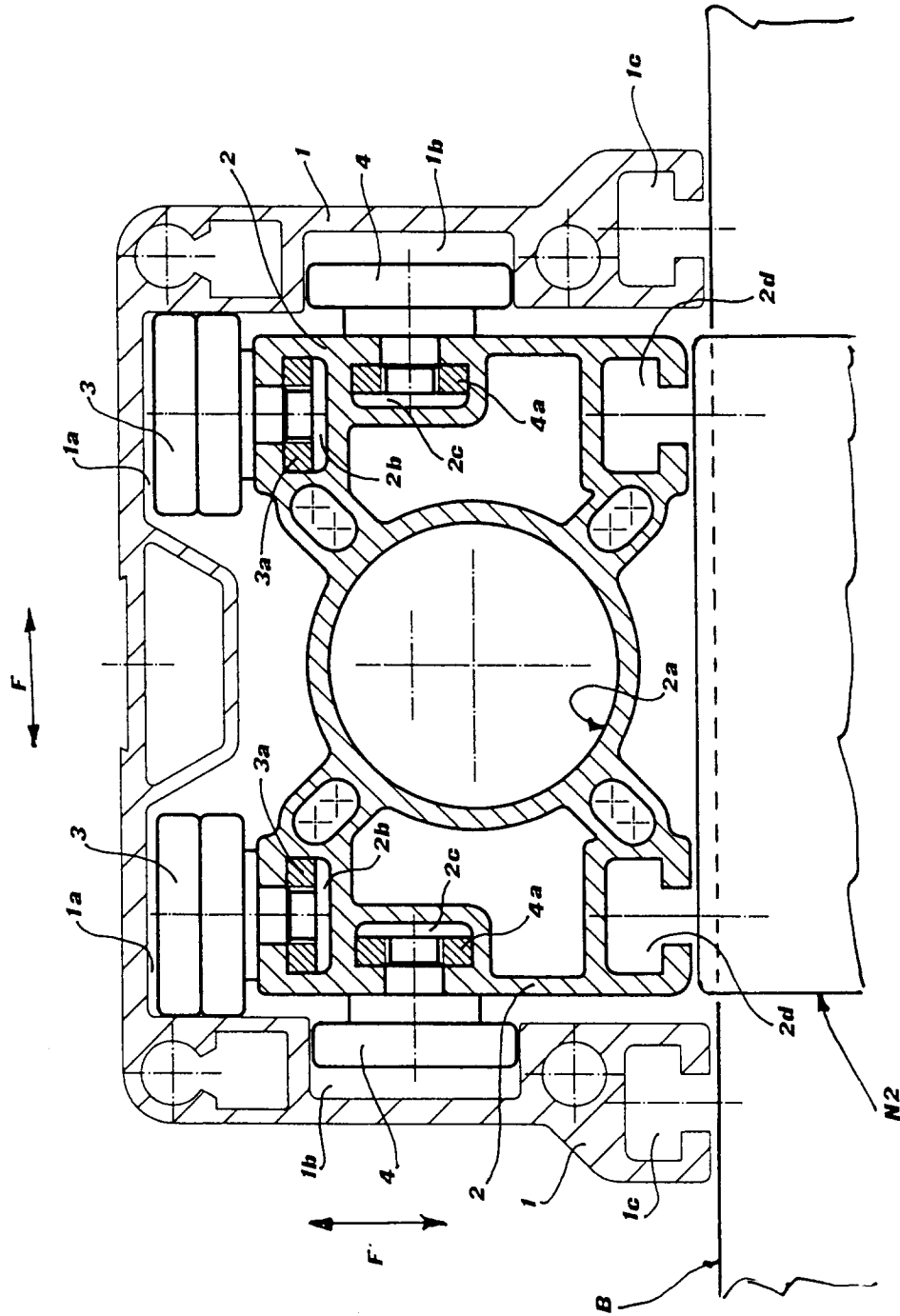


FIG. 1

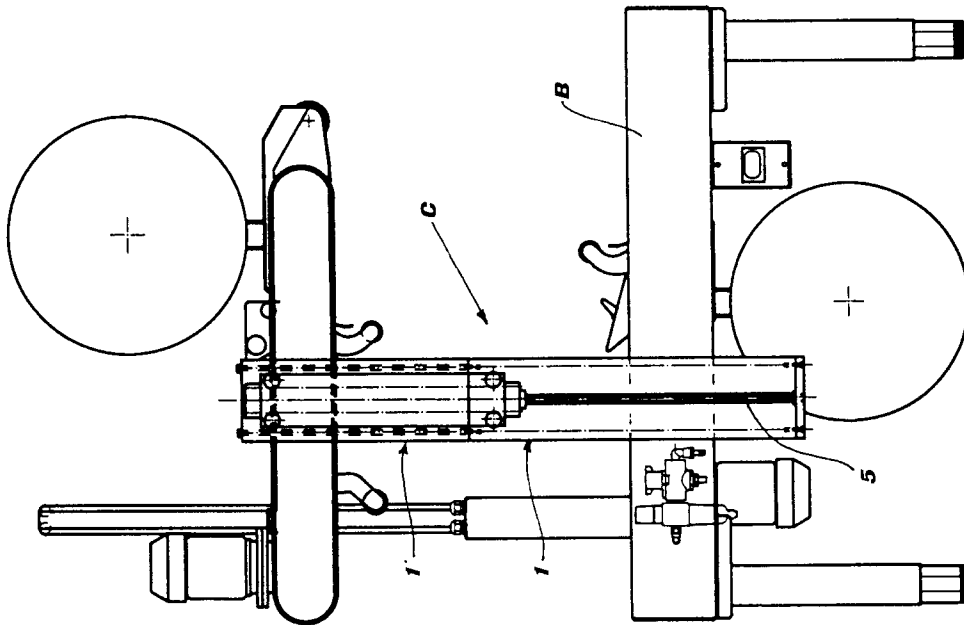


FIG. 2

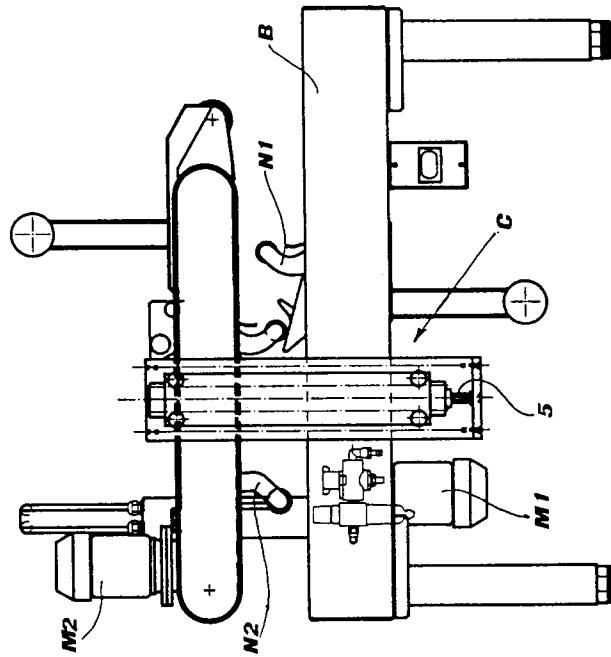


FIG. 3



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EUROPEAN SEARCH REPORT

Application Number
EP 95 10 8229

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-A-26 51 413 (A. MARCHETTI) * page 8, line 14 - page 9, line 21; figures * ---	1-5	B65B51/06 B65B7/20
X	DE-A-22 31 321 (A. MARCHETTI) * page 8, line 1 - line 30; figures * ---	1-5	
X	US-A-4 044 527 (L. ULRICH) * column 3, line 53 - column 4, line 22; figures 1,4,5 * -----	1-5	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 20 September 1995	Examiner Jagusiak, A
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