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

(11) EP 1 992 462 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
19.11.2008 Bulletin 2008/47

(51) Int Cl.:
B27D 5/00 *(2006.01)*

(21) Application number: **08155997.3**

(22) Date of filing: **09.05.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

(30) Priority: **11.05.2007 IT MO20070155**

(71) Applicant: **SCM Group S.p.A.**
47900 Rimini (IT)

(72) Inventor: **Meneghetti, Giovanni**
36030, Caldonio (VI) (IT)

(74) Representative: **Crugnola, Pietro**
Luppi & Associati S.r.l.
Via Camperio, 11
20123 Milano (IT)

(54) Apparatus for trimming panel edge elements

(57) An apparatus for trimming an edge element of a panel (3) comprises a frame (8, 9), operating means (40) having trimming means (41) for trimming an exceeding part (18) of said edge element (2) along an operating path and positioning means arranged for engaging with a zone of said panel (3) devoid of said edge element (2) so as to guide said trimming means along said path, oscillating arm means (10, 20; 210, 220) that is rotatable so as to enable said operating means (40) to follow an edge (61) of said panel (3), and said oscillating arm means (10, 20; 210, 220) is hinged on said frame (8, 9) so as to rotate even whilst said operating means (40) follows a further edge (60) of said panel (3) that is longitudinally opposite said edge (61).

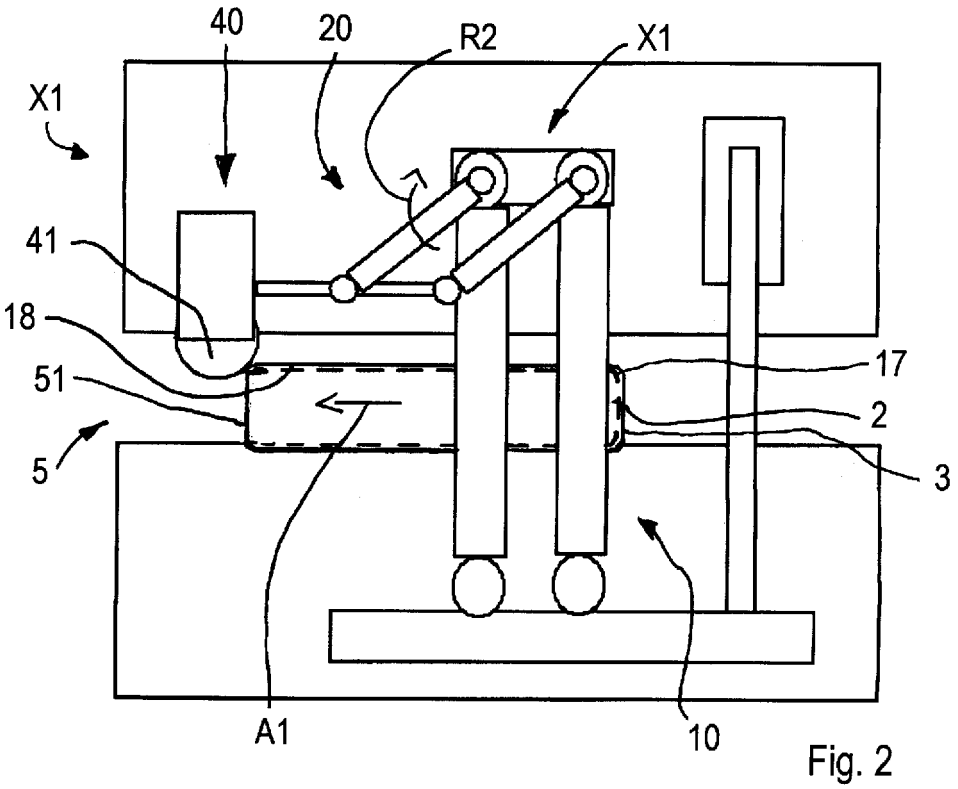

Fig. 2

EP 1 992 462 A1

Description

[0001] The invention relates to an apparatus for trimming an edge element applied to a panel.

[0002] An edge-finishing laminar element can be applied to one or several sides of panels made of wood or of a similar wood-based composite material. The laminar element has a height and a length that are greater respectively than the thickness and the length of the panel. It is therefore necessary to trim the edge laminar element, i.e. separate therefrom, and therefore from the panel, those edge element parts that protrude from the profile of the section of the panel.

[0003] Apparatuses are known for trimming panels, comprising a conveyor on which the panels, to which an edge element to be trimmed has been applied, are conducted through a trimming zone. In the trimming zone a trimming unit is provided comprising a milling cutter that removes the exceeding material from the edge element, and a feeler pin roller, which is coaxial with the milling cutter, by means of which the milling cutter is guided to follow the profile of the panel. The trimming unit is slidably supported by a guide that is tilted with respect to an advance direction panel.

[0004] During the advance of the panel, the feeler pin roller, by engaging a zone of the panel devoid of the edge element, induces the trimming unit to move along the guide means so as to position the milling cutter at a distance from the panel so as to enable the edge element to be trimmed. Trimming starts when a first end of the edge element is in contact with the milling cutter. A pneumatic actuator is provided that is arranged for pushing the trimming unit against the edge of the panel to be trimmed.

[0005] Due to the tilt of the guide with respect to the advance direction of the panel, the trimming unit does not work appropriately on the second end of the edge element positioned further downstream of the first end according to the advance direction of the panel. This is because, due to the tilt of the guide, the milling cutter tends to escape from the edge rather than being pushed against the edge.

[0006] The apparatus thus comprises a further guide having a tilt opposite the guide according to the advance direction of the panel. The further guide slidably supports the end part of the guide. The guide moves along the further guide so as to enable the milling cutter to trim the second end of the edge element.

[0007] A drawback is that as two guides are provided, significant space is occupied along the advance direction of the panel.

[0008] Another trimming apparatus is further known in which in the trimming zone there is provided a single trimming unit. The trimming unit is slidably supported by a guide in a similar manner to the apparatus disclosed above. The guide is fixed to an oscillating arm that enables the tilt of the guide to be varied with respect to the advance direction of the panel. The oscillating arm is driven by a further pneumatic actuator. In this manner, the trimming unit can rotate in a direction in accordance with the advance direction of the panel, i.e. following the panel, so as to enable the milling cutter to trim the second end of the edge element.

[0009] A drawback of such an apparatus is that it is significantly complex. In such an apparatus, in fact, two pneumatic actuators are provided, one arranged for rotating the oscillating arm and the other for moving the trimming unit along the guide. The complexity of the apparatus thus entails high acquisition and maintenance costs.

[0010] A further drawback of known apparatuses is that the trimming unit can slide along the respective guide only at a preset speed, which depends on the air flow rate of the pneumatic actuator.

[0011] An object of the invention is to improve apparatuses for trimming an edge element of a panel.

[0012] A further object of the invention is to make an apparatus for trimming an edge element of a panel that is less bulky than known apparatuses.

[0013] A still further object of the invention is to make an apparatus for trimming an edge element of a panel that is constructionally simpler and therefore less costly than known apparatuses.

[0014] According to the invention, there is provided an apparatus for trimming an edge element of a panel, comprising: a frame, operating means having trimming means for trimming an exceeding part of said edge element along an operating path and positioning means arranged for engaging with a zone of said panel devoid of said edge element so as to guide said trimming means along said path, oscillating arm means that is rotatable so as to enable said operating means to follow an edge of said panel, characterised in that said oscillating arm means is hinged on said frame so as to rotate even whilst said operating means follows a further edge of said panel that is longitudinally opposite said edge.

[0015] Owing to the invention, it is possible to obtain an apparatus for trimming an edge element of a panel that is constructionally simple and not much bulky. The oscillating arm means rotates to enable the operating means to follow both an outlet edge, i.e. an edge that abandons the trimming apparatus, and an inlet edge, i.e. an edge that is taken towards the trimming apparatus. The apparatus is constructionally simpler than known apparatuses, inasmuch as the apparatus does not require two guides. Further, given the arrangement of the oscillating arm means replacing the prior-art guides, the apparatus has smaller overall dimensions.

[0016] The invention can be better understood and implemented with reference to the attached drawings, which illustrate an embodiment thereof by way of non-limiting example, in which:

Figure 1 is a schematic frontal view of the apparatus during a rest configuration;

Figure 2 is a view of the apparatus 1 like that in Figure

1, during an operating configuration;
Figure 3 is a view of the apparatus 1 like that in Figure 1, during a further operating configuration;
Figure 4 is a view of the apparatus 1 like that in Figure 1, during a still further operating configuration;
Figure 5 is a perspective view of a panel provided with an edge element to be trimmed;
Figure 6 a schematic frontal view of an embodiment of the apparatus in Figure 1, during a rest configuration;
Figure 7 is a schematic frontal view of a further embodiment of the apparatus in Figure 1, during a rest configuration;
Figure 8 is a schematic frontal view of a still further embodiment of the apparatus in Figure 1, during a rest configuration.

[0017] Figure 1 shows an apparatus 1 for trimming an edge element 2 that has been applied to a panel 3.

[0018] The edge element 2, which has to be trimmed, in fact has a greater surface than a section 17 of the panel 3.

[0019] The apparatus 1 can be associated with an edgebanding machine arranged for applying the edge element 2 to the panel 3. The edgebanding machine comprises a base 4 that defines a supporting plane P for the panel 3 and comprises moving means, which is not shown, arranged for supporting and moving the panel 3 through a trimming zone 5.

[0020] The panel 3 advances in the trimming zone 5 along an advance direction A1 that is substantially arranged according to a prevalent dimension of the edge element 2.

[0021] The panel 3 is arranged so that the edge element 2 to be trimmed protrudes with respect to the base 4 according to a direction that is substantially perpendicular to the advance direction A1.

[0022] The edgebanding machine comprises pressing means 6, arranged at the base 4 at a greater vertical height. The position of the pressing means 6 with respect to the base 4 is such as to enable the panel 3 to advance.

[0023] The apparatus 1 comprises a frame provided with supporting means 8 arranged according to the advance direction A1 at a vertical height that is less than that of the panel 3 and in a position that is more advanced than the base 4 according to the direction that is perpendicular to the advance direction A1. The supporting means 8 is associated with the pressing means 6 by connecting means 9 having an end part 82 fixed to the supporting means 8. The connecting means 9 is provided with a further end part 81 fixed to the pressing means 6. In this manner, by varying the distance between the pressing means 6 and the supporting plane P, it is possible to vary the position of the supporting means 8 with respect to the supporting plane P in order to machine panels 3 having thicknesses comprised within a preset range of thicknesses.

[0024] The apparatus 1 further comprises oscillating arm means 10, comprising a first oscillating arm 11 that has a first end 13 hinged on the supporting means 8. The first oscillating arm 11 is thus rotatably supported by the supporting means 8 and projects from the supporting rod 8 to the pressing means 6. The first oscillating arm 11 is free to make angular movements in a rotation direction R1, around an axis C1 that is substantially perpendicular to the advance direction A1.

[0025] The first oscillating arm 11 has a second end 14 hinged on a connecting rod 15 that is arranged alongside the pressing means 6 and on an opposite side of the supporting plane P with respect to the supporting means 8.

[0026] The oscillating arm means 10 comprises a second oscillating arm 12 parallel to the first oscillating arm 11 and arranged upstream of the first oscillating arm 11 according to the advance direction A1. The second oscillating arm 12 is structurally and functionally shaped like the first oscillating arm 11.

[0027] The connecting rod 15 is supported both by the first oscillating arm 11 and by the second oscillating arm 12. In this manner, during rotation of the oscillating arm means 10, each point of the connecting rod 15 moves along a circumference arc whilst the connecting rod 15 remains parallel to the advance direction A1.

[0028] The supporting means 8, the connecting rod 15, the first oscillating arm 11 and the second oscillating arm 12 form a main articulated quadrilateral 30, in particular a four-bar linkage.

[0029] The apparatus 1 further comprises further oscillating arm means 20 comprising a further first oscillating arm 21 that has a further first end 23 hinged on the connecting rod 15. The further first oscillating arm 21 is thus rotatably supported by the connecting rod 15 and protrudes from the connecting rod 15 to the supporting plane P. The further first oscillating arm 21 is free to perform an angular movement in a further rotation direction R2, around a further axis C2 that is substantially parallel to the axis C1, and is movable together with the connecting rod 15.

[0030] The further first oscillating arm 21 is hinged at a further second end 24 on a second connecting rod 16 in a central region 35 of the second connecting rod 16.

[0031] The further oscillating arm means 20 comprises a further second oscillating arm 22, parallel to the further first oscillating arm 21 and arranged upstream of the further first oscillating arm 21 according to the advance direction A1. The further second oscillating arm 22 is structurally and functionally shaped like the further first oscillating arm 21.

[0032] The second connecting rod 16 is arranged according to the advance direction A1 and is supported in the central region 35 by the further first oscillating arm 21 and in a first peripheral region 36 by the further second oscillating arm 22. In this manner, during rotation of the further oscillating arm means 20, each point of the second connecting rod 16 moves along a circumference arc whilst the second connecting rod 16 remains parallel to

the advance direction A1.

[0033] The connecting rod 15, the second connecting rod 16, the further first oscillating arm 21 and the further second oscillating arm 22 form a secondary articulated quadrilateral 31, in particular a four-bar linkage hinged on the main articulated quadrilateral 30.

[0034] The apparatus 1 further comprises operating head means 40 that is fixed to a second peripheral region 37 of the second connecting rod 16, opposite the first peripheral region 36. The operating head means 40 comprises a milling tool 41.

[0035] The operating head means 40 further comprises positioning means, which is not shown, arranged for constantly maintaining a contact between the edge element 2 and the milling tool 41. The positioning means may comprise a roller suitable for engaging a surface of the panel 3 to which the edge element 2 is not applied.

[0036] The roller interacts with the surface of the panel 3 in transit and is induced to rotate on the surface of the panel 3. In this manner the positioning means is able to follow the profile of the section 17.

[0037] Figure 1 shows the apparatus 1 in a rest configuration X0, in which the edge element 2 has not yet been trimmed. The milling tool 41 is not yet in contact with the edge element 2 and both the oscillating arm means 10 and the further oscillating arm means 20 are parallel to one another and arranged along a direction A2 substantially perpendicular to the supporting plane P.

[0038] Figure 5 shows the edge element 2 applied to the panel 3. The milling tool 41 removes from the edge element 2 portions 18 of the edge element 2 that protrude from the section 17.

[0039] The panel 3 comprises an inlet edge 60 that first interacts with the operating head means 40 and is arranged substantially in a direction that is perpendicular to the advance direction A1. The panel 3 comprises an outlet edge 61, opposite the inlet edge 60 according to the advance direction A1. The panel 3 further comprises a central part 62 with a substantially rectangular section arranged between the inlet edge 60 and the outlet edge 61.

[0040] The edge element 2 has a first peripheral portion 51, arranged near the inlet edge 60, and a second peripheral portion 52, arranged near the outlet edge 61. The edge element 2 has a main portion 53 arranged at the central part 62.

[0041] Figures 2, 3 and 4 show the apparatus 1 in a series of subsequent operating configurations.

[0042] In operation, the panel 3 is initially supported and moved by the moving means along the advance direction A1.

[0043] The edge element 2 starts to be trimmed when the operating head means 40 meets the inlet edge 60. In particular, the roller of the positioning means meets the surface of the panel 3 to which the edge element 2 is not applied, whilst the milling tool 41 comes into contact with and trims the first peripheral portion 51. By advancing the panel 3 along the advance direction A1, the roller, by engaging with the inlet edge 60, rises. The milling tool 41, by moving together with the roller, in turn lifts up, maintaining itself in contact with the first peripheral portion 51 and then removes the portions 18 from the edge element 2. The position of the oscillating arm means 10 does not vary with respect to the position assumed in the rest configuration X0. On the other hand, the further oscillating means 20 rotates around the further rotation direction R2, so as to induce the second connecting rod 15 to move along a circumference arc in accordance with the advance direction A1. In this manner, whilst the panel 3 advances along the advance direction A1, the motion of the second connecting rod 16 is such as to enable the operating head means 40 to follow the profile of the inlet edge 60.

[0044] The apparatus 1 thus assumes a first operating configuration X1, as Figure 2 shows.

[0045] In a subsequent step, when the panel 3 proceeds through the trimming zone 5, the positioning means is engaged on the central part 62, maintaining the milling tool 41 in contact on the main portion 53. In this case the oscillating arm means 10 continues not to vary their position with respect to that assumed in the rest configuration X0, whilst the further oscillating arm means 20 further rotates according to the further rotation direction R2 in the direction in accordance with the advance direction A1, i.e. following the panel 3, so as to lift the second connecting rod 16 by a sufficient quantity to the milling tool 41 to be arranged on the main portion 53. The apparatus 1 then assumes a second operating configuration X2, as shown in Figure 3.

[0046] Whilst the panel 3 proceeds along the advance direction A1, the apparatus 1 maintains the second operating configuration X2, enabling the milling tool 41 to trim the main portion 53 completely.

[0047] The apparatus 1 changes its operating configuration when the outlet edge 61 meets the roller of the positioning means. At this point the roller is lowered and the milling tool 41, moving together with the roller, is in turn lowered, maintaining itself in contact with the second peripheral portion 52. In this manner, the milling tool 41 trims the second peripheral portion 52. In this case, the further oscillating arm means 20 maintains the position assumed in the second operating configuration X2, whilst the oscillating arm means 10 rotates around the rotation direction R1, so as to induce the connecting rod 15 to move along a circumference arc in accordance with the advance direction A1. The second connecting rod 16 then moves along a further circumference arc similar to the circumference arc moved along by the connecting rod 15 but having a greater radius. The motion of the second connecting rod 16 is thus breakable into a first component having the advance direction A1 and into a second component having the direction A2. In this manner, whilst the panel 3 advances along the advance direction A1, the operating head means 40 is able to follow the profile of the outlet edge 61. The apparatus 1 thus assumes the third operating configuration X3, shown in

Figure 4, that ensures complete trimming also of the second peripheral portion 52.

[0048] The apparatus 1 is further able to trim edge elements 2 having considerable thicknesses. By positioning the pressing means 6 at a greater vertical height it is possible to vary the relative distance of the supporting rod 8 with respect to the supporting plane P. In this manner the milling tool 41 is able to trim the main portion 35 arranged at a greater vertical height.

[0049] If it is necessary to modify the speed at which the trimming means 41 interacts with the edge element 2, it is possible to vary the geometry of the kinematic mechanism of the main articulated quadrilateral 30 and of the secondary articulated quadrilateral 31. For example, it is possible to modify the hinging points of the connecting rod 15 on the oscillating arm means 10 and/or the hinging points of the second connecting rod 16 on the further oscillating arm means 20.

[0050] It is possible to provide a further apparatus, arranged for trimming a further main portion opposite the main portion 53 according to the direction A2. The further apparatus is structurally and functionally shaped like the apparatus 1 and is arranged on the side opposite the apparatus 1 with respect to the advance direction A1.

[0051] In the embodiment in Figure 6 there is shown an apparatus 101 according to an alternative embodiment. The parts of the apparatus 101 that are common to the apparatus 1 are indicated by the same reference numbers. The apparatus 101 is devoid of the secondary articulated quadrilateral 31, in particular the apparatus 101 does not have the second connecting rod 16 and the further oscillating arm means 20. The apparatus 101 on the other hand comprises a connecting rod 115, in replacement of the connecting rod 15 present in the apparatus 1. The differs from the connecting rod 15 inasmuch as connecting rod 115 has an additional part 19 arranged along the advance direction A1 that supports the operating head means 40.

[0052] The supporting means 8 is positioned so as to enable the milling tool 41 to be in contact with the main portion 53 when the connecting rod 115 is positioned near a dead centre D. The dead centre D is arranged on a circumference arc R, on which the connecting rod 115 moves during rotation of the oscillating arm means 10 according to the rotation direction R1. The connecting rod 115 is positioned at the dead centre D when the first oscillating arm 11 and the second oscillating arm 12 are arranged according to the direction A2. The dead centre D has a distance from the supporting plane P that is greater than all the other points of the circumference arc R. Figure 6 shows the apparatus 101 in the rest configuration YO, in which the milling tool 41 is not in contact with the edge element 2 which has to be trimmed.

[0053] In the rest configuration Y0 the oscillating arm means 10 is tilted towards the approaching panel 3 by an angle with respect to the advance direction A1 such as to position the connecting rod 115 at an end point E of the circumference arc R.

[0054] During operation, by advancing the panel 3 along the advance direction A1, the roller of the positioning means meets the inlet edge 60. The roller then rises, and the milling tool 41, moving together with the roller, rises in turn, maintaining itself in contact with the first peripheral portion 51. The oscillating arm means 10 rotates according to the rotation direction R1, so as to induce the connecting rod 115 to move along the circumference arc R in accordance with the advance direction A1. In this manner, whilst the panel 3 advances along the advance direction A1, the motion of the connecting rod 115 is such as to enable the operating head means 40 to follow the profile of the inlet edge 60. The first peripheral portion 51 is trimmed during the motion of the connecting rod 115 from the end point E to the dead centre D.

[0055] When the connecting rod 115 is at the dead centre D, the first peripheral portion 51 has been completely trimmed and the milling tool starts to trim the main portion 53. Whilst the main portion 53 is trimmed, the panel 3 continues to advance along the advance direction A1. The oscillating arm means 10 remains arranged according to the direction A2, maintaining in this manner the connecting rod 115 at the dead centre D. At the end of trimming of the main portion 53, the roller meets the outlet edge 61 moving along the profile of the outer edge 61 and dragging the milling tool 41 that is maintained in contact with the second peripheral portion 52. The oscillating arm means 10 rotates according to the rotation direction R1, i.e. following the panel 3, so as to move the connecting rod 115 along the circumference arc R in accordance with the advance direction A1. In this manner, whilst the panel 3 advances along the advance direction A1, the operating head means 40 is able to follow the profile of the outlet edge 61. The second peripheral portion 52 is then trimmed during the motion of the connecting rod 115 from the top dead centre D to the further end point of the circumference arc R. The further end point is positioned at the same vertical height as the end point D and opposite the end point E with respect to the top dead centre D according to the advance direction A1.

[0056] In the embodiment in Figure 7 there is shown an apparatus 201, according to a further alternative embodiment. The parts of the apparatus 201 that are common to the apparatus 1 are indicated by the same reference numbers. The apparatus 201 is devoid of the connecting means 9. The supporting means 8 is fixed to the pressing means 6, and rotatably supports oscillating arm means 210 so that the oscillating arm means 210 protrudes from the supporting means 8 to the supporting plane P. The oscillating arm means 210 rotatably supports a connecting rod 15. The apparatus 201 further comprises further oscillating arm means 220, structurally shaped like the oscillating arm means 20. In a rest configuration Z0, the milling tool 41 is not yet in contact with the edge element 2. The oscillating arm means 210 is arranged along the direction A2, whilst the further oscillating arm means 220 is tilted towards the approaching

panel 3.

[0057] During operation, by advancing the panel 3 along the advance direction A1, the roller of the positioning means meets the inlet edge 60. The roller then rises, and the milling tool 41, moving together with the roller, rises in turn, maintaining itself in contact with the first peripheral portion 51. The position of the further oscillating arm means 220 does not vary with respect to that assumed in the rest configuration Z0, on the other hand the oscillating arm means 210 rotates according to a rotation direction R3, so as to enable the operating head means 40 to follow the profile of the inlet edge 60.

[0058] Whilst the main portion 53 is trimmed, both the oscillating arm means 210 and the further oscillating arm means 220 do not change the position that they assumed in the preceding configuration. At the end of trimming of the main portion 53, the roller meets by moving along the profile of the outlet edge 61 and dragging the milling tool 41, which is maintained in contact with the second peripheral portion 52. The oscillating arm means 220 rotates according to a further rotation direction R4, i.e. following the panel 3. The rotation direction R4 is in accordance with the rotation direction R3. In this manner, whilst the panel 3 advances along the advance direction A1, the operating head means 40 is able to follow the profile of the outlet edge 61.

[0059] In the embodiment in Figure 7 there is shown an apparatus 301, according to a still further alternative embodiment. The apparatus 301 is functionally shaped like the apparatus 201 and differs therefrom by the fact that the supporting means 8 is not fixed to the pressing means 6 but is supported on an upright 309.

Claims

1. Apparatus for trimming an edge element of a panel (3) comprising a frame (8, 9), operating means (40) having trimming means (41) for trimming an exceeding part (18) of said edge element (2) along an operating path and positioning means arranged for engaging with a zone of said panel (3) devoid of said edge element (2) so as to guide said trimming means along said path, oscillating arm means (10, 20; 210, 220) that is rotatable so as to enable said operating means (40) to follow an edge (61) of said panel (3), **characterised in that** said oscillating arm means (10, 20; 210, 220) is hinged on said frame (8, 9) so as to rotate even whilst said operating means (40) follows a further edge (60) of said panel (3) that is longitudinally opposite said edge (61).

2. Apparatus according to claim 1, wherein said oscillating arm means comprises a pair of oscillating arms (11, 12; 220), hinged so as to rotate according to a direction (R1; R4) to follow said outlet edge (61).

3. Apparatus according to claim 2, wherein said pair of oscillating arms (11, 12; 220) define opposite rods of an articulated quadrilateral (30).

4. Apparatus according to claim 2, or 3, wherein said oscillating arm means comprises a further pair of oscillating arms (21, 22), hinged so as to rotate according to a further direction (R2), opposite said direction (R1) to follow said inlet edge (60).

5. Apparatus according to claim 2, or 3, wherein said oscillating arm means comprises a further pair of oscillating arms (210), hinged so as to rotate according to a still further direction (R3), in accordance with said direction (R4) to follow said inlet edge (60).

6. Apparatus according to claim 4, or 5, wherein said further pair of oscillating arms (21, 22; 210) define opposite rods of a further articulated quadrilateral (31).

7. Apparatus according to any one of claims 4 to 6, wherein said further pair of oscillating arms (21, 22; 210) is hinged on said pair of oscillating arms (11, 12; 220) near an end zone (14) of said pair of oscillating arms (11, 12; 220).

8. Apparatus according to any preceding claim, wherein said frame (8, 9) is movable transversely to a supporting plane (P) of said panel (3).

9. Apparatus according to claim 8, wherein said frame (8, 9) is movable substantially perpendicularly to said supporting plane (P).

10. Apparatus according to any preceding claim, wherein said oscillating arm means (10) is hinged on said frame (8, 9) so as to enable said trimming means (41) to interact with a main portion (53) of said edge element (2), when said oscillating arm means (10) is arranged substantially perpendicularly to said panel (3).

11. Apparatus according to claim 10, wherein said oscillating arm means (10) is hinged on said frame (8, 9) so that said operating means (40) interacts with said inlet edge (60) whilst said operating means (40) moves along a circumference arc and said operating means (40) interacts with said outlet edge (61) whilst said operating means (40) moves along a second part of said circumference arc.

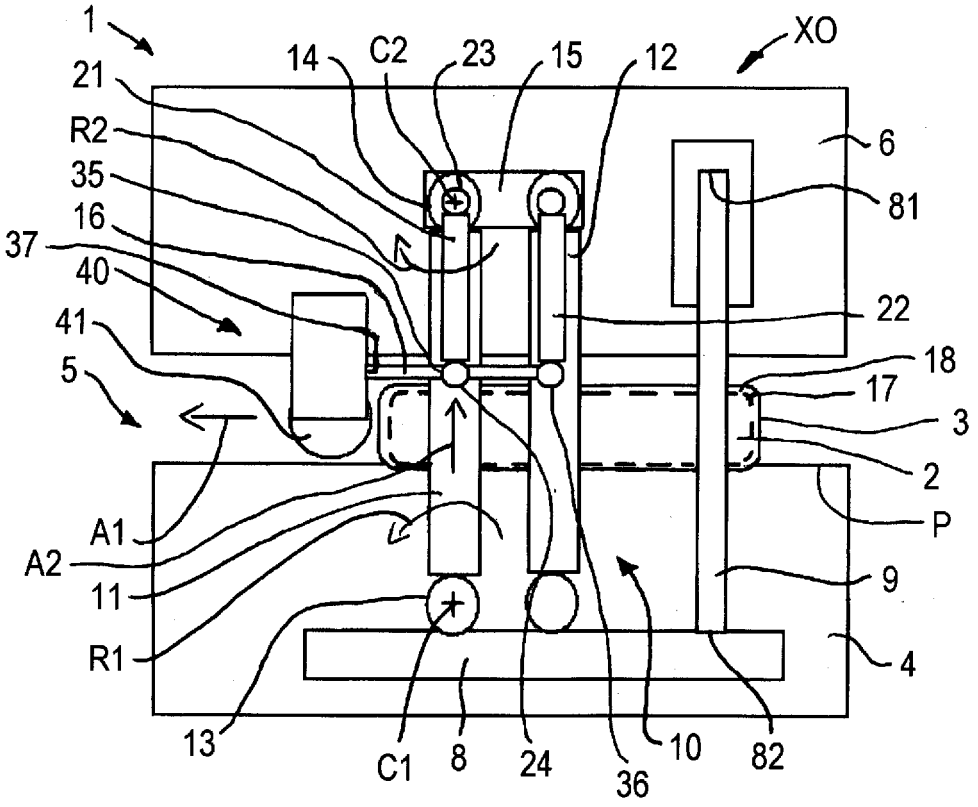
1
14
C2
23
15
12
XO
21
R2
35
16
37
40
41
5
6
81
22
18
17
3
2
P
A1
A2
11
R1
9
4
13
C1
8
24
36
10
82

Fig. 1

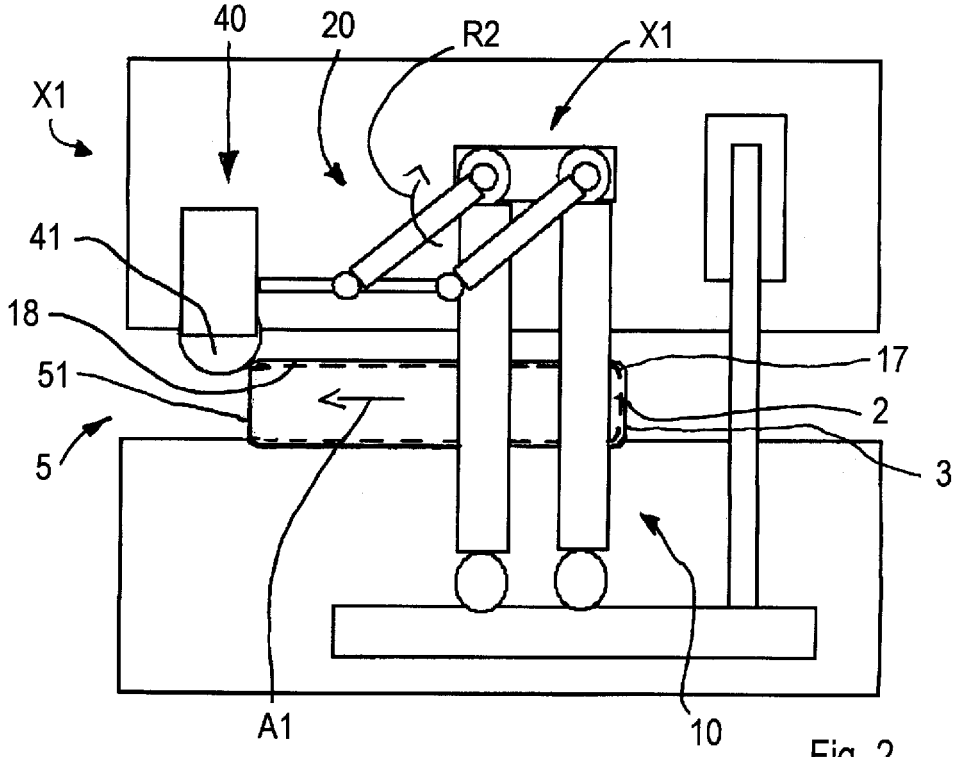
40
20
R2
X1
X1
41
18
51
5
17
2
3
A1
10

Fig. 2

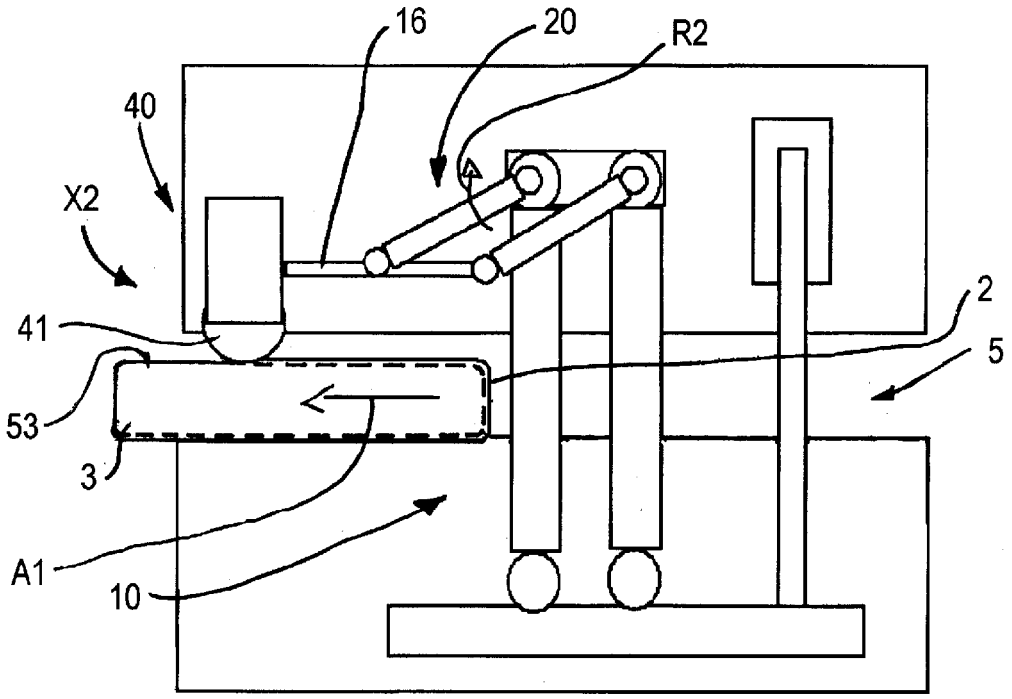

Fig. 3

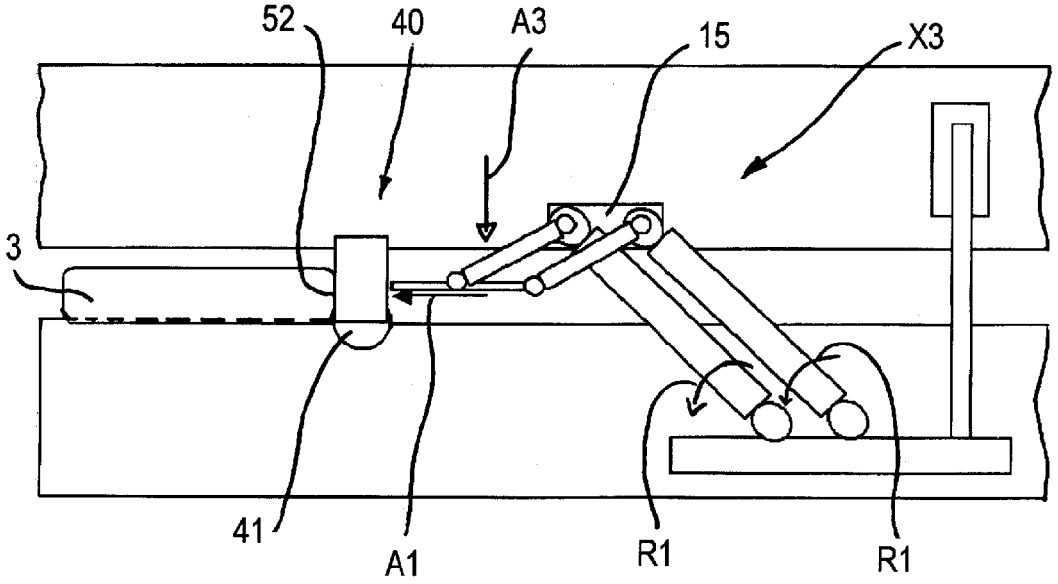

Fig. 4

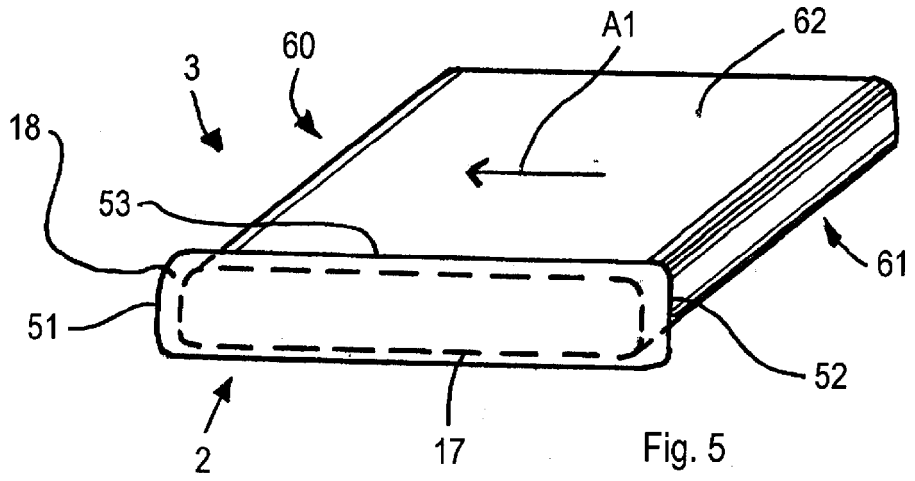
A1
62
60
3
18
53
61
51
52
2
17

Fig. 5

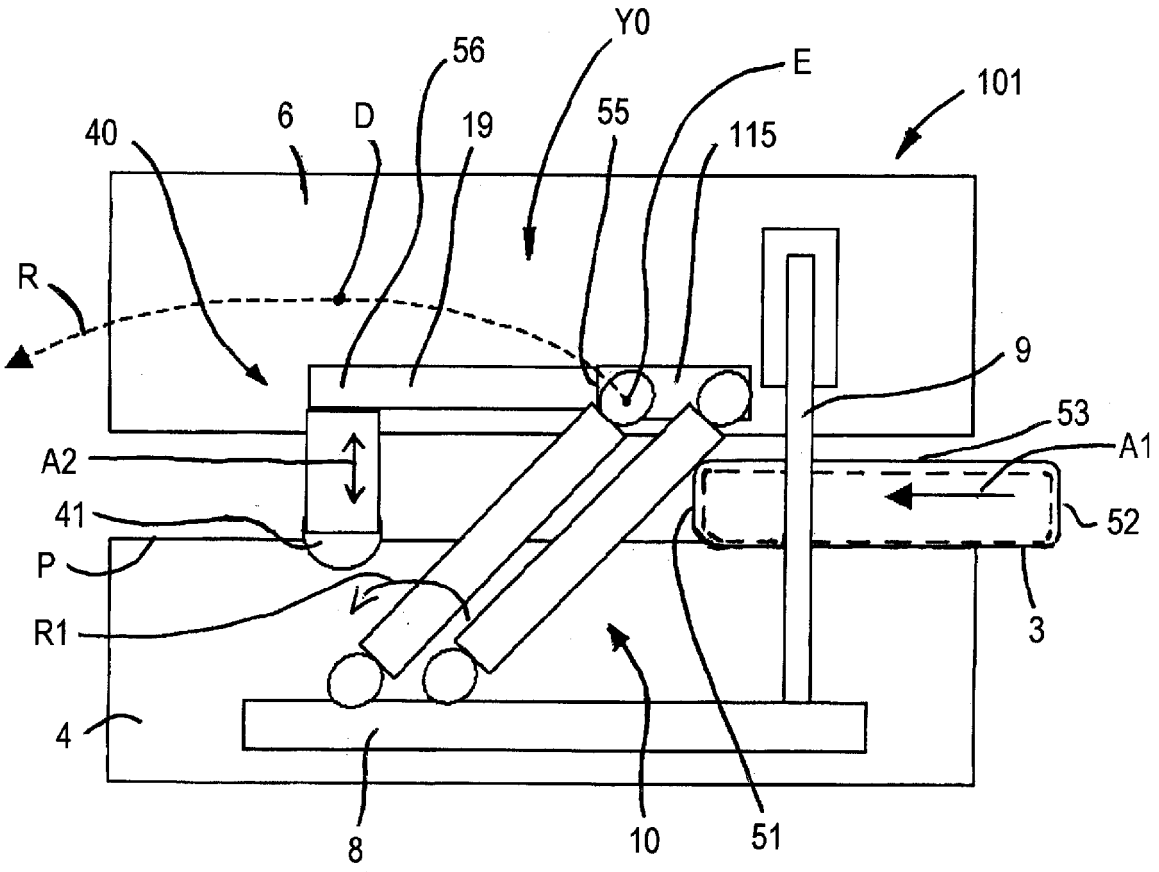
Y0
56
E
101
40
6
D
19
55
115
R
9
53
A1
A2
41
52
P
R1
3
4
8
10
51

Fig. 6

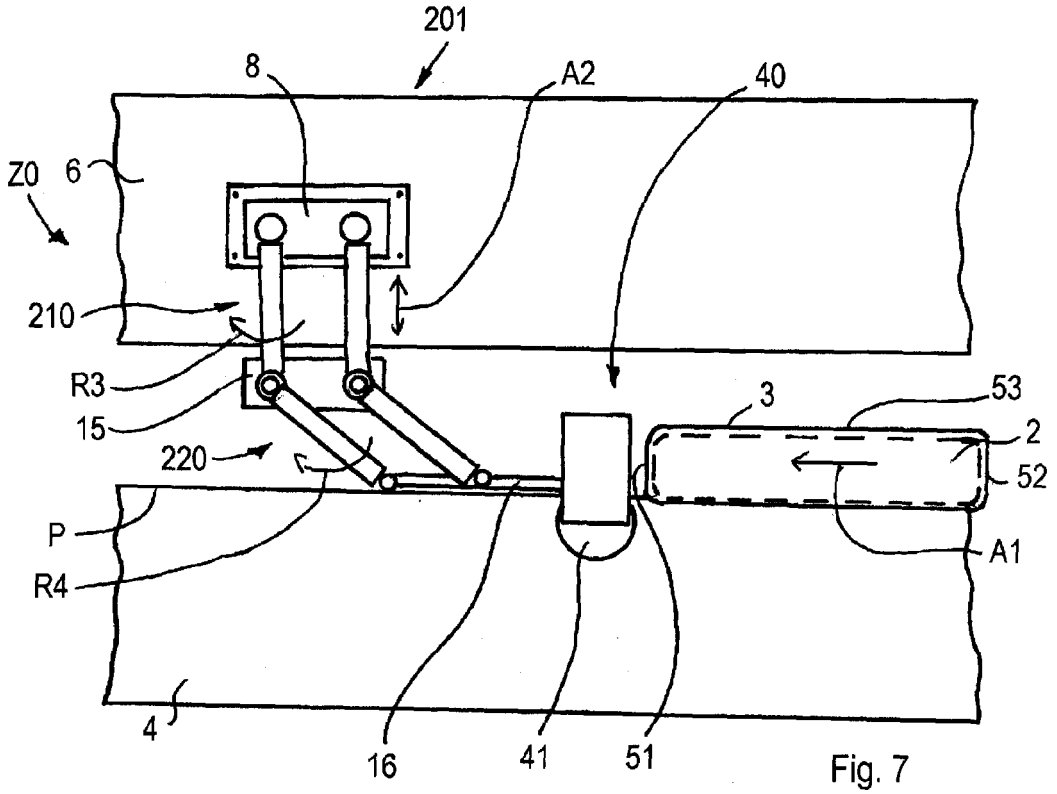
201
8
A2
40
Z0
6
210
R3
15
220
3
53
2
52
P
R4
A1
4
16
41
51

Fig. 7

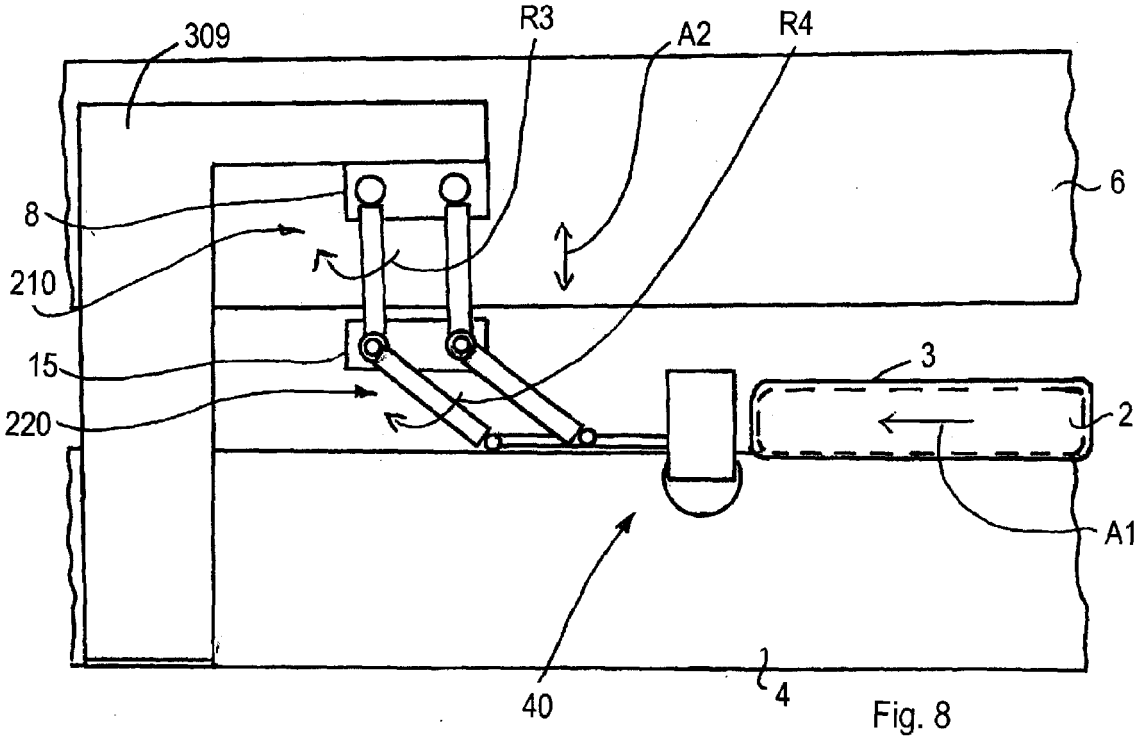
309
R3
A2
R4
6
8
210
15
3
220
2
A1
40
4

Fig. 8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 08 15 5997

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 203 08 037 U1 (PAUL OTT GMBH [AT]) 7 August 2003 (2003-08-07) * figures 1-4 *	1-11	INV. B27D5/00
X	US 4 991 637 A (BUTLER TIMOTHY J [US]) 12 February 1991 (1991-02-12) * abstract; figures *	1-6,10, 11	
X	EP 0 602 308 A (HOMAG MASCHINENBAU AG [DE]) 22 June 1994 (1994-06-22)	1,8-11	
A	* abstract; figures *	2-7	

TECHNICAL FIELDS SEARCHED (IPC)

B27D
B23C
B23Q
B23D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	20 August 2008	Meritano, Luciano

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 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 15 5997

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

20-08-2008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 20308037 U1	07-08-2003	AT 375222 T	15-10-2007
		AT 336324 T	15-09-2006
		EP 1479467 A1	24-11-2004
		EP 1624989 A1	15-02-2006
		WO 2004103621 A1	02-12-2004
		ES 2294394 T3	01-04-2008
		ES 2270378 T3	01-04-2007
US 4991637 A	12-02-1991	NONE	
EP 0602308 A	22-06-1994	AT 134557 T	15-03-1996
		DE 4243054 C1	14-07-1994
		JP 6218702 A	09-08-1994

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82