



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.01.2002 Bulletin 2002/04

(51) Int Cl.7: **B24B 9/10**, B24B 41/04,
B24B 27/00

(21) Application number: **01114788.1**

(22) Date of filing: **26.06.2001**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR**
Designated Extension States:
AL LT LV MK RO SI

(71) Applicant: **Z. BAVELLONI S.p.A.**
I-22070 Bregnano (Como) (IT)

(72) Inventor: **Bavelloni, Franco**
22020 San Fermo Della Battaglia (Como) (IT)

(30) Priority: **17.07.2000 IT MI001617**

(74) Representative: **Modiano, Guido, Dr.-Ing. et al**
Modiano & Associati SpA Via Meravigli, 16
20123 Milano (IT)

(54) **Apparatus for working the edges of glass plates**

(57) An edging unit (1) applicable to machines for working the edges of plates, particularly of glass plates (L), comprising, at at least one edge of a plate (L) being worked, a first movable element (2) and a second movable element (3) which respectively support a first grind-

ing wheel (5) and a second grinding wheel (6). The movable elements (2,3) are connected to actuators (20,21) in order to respectively move the first grinding wheel (5) so that it acts on the front edge of the plate (L) being worked and the second grinding wheel (6) so that it acts on the rear edge.

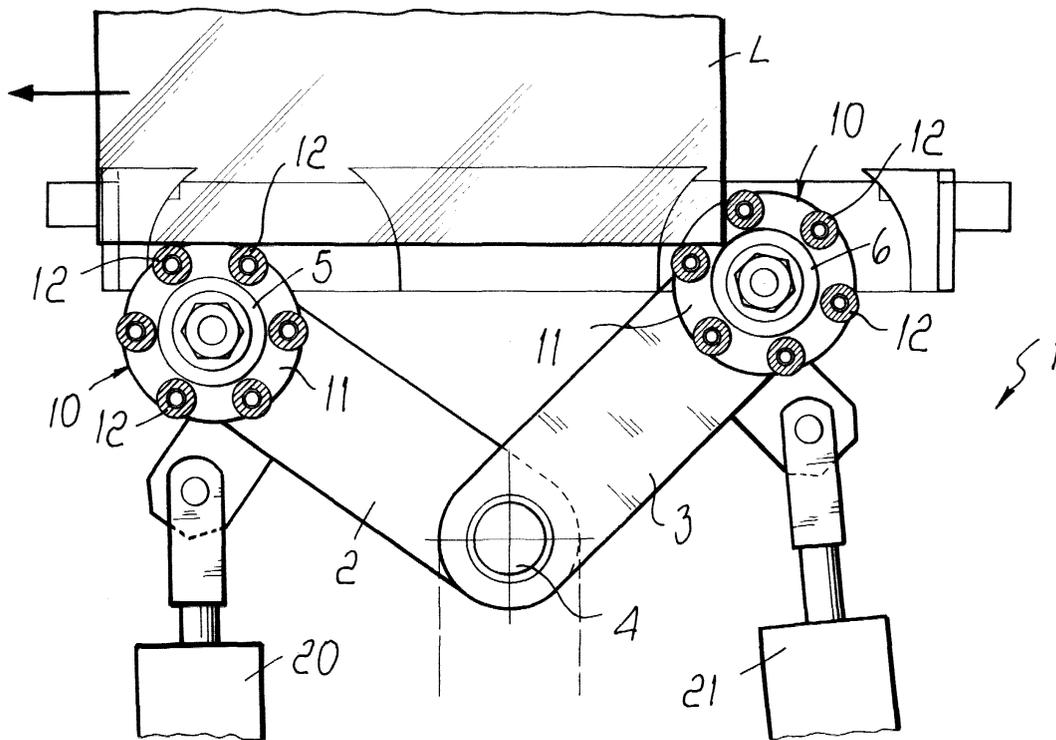


Fig.1

Description

[0001] The present invention relates to an edging unit applicable to machines for working the edges of plates particularly of glass plates.

[0002] It is known that edging units are currently applied to machines for working the edges of plates in general and of glass plates in particular; in practice, said units are used to produce a slight bevel at the edge of the plate.

[0003] This operation, which is absolutely necessary for glass plates to be subsequently subjected to tempering, is meant to bevel the edge and is performed by means of a grinding wheel rotatable inside a carousel element provided by a plurality of rollers which form the coupling with the edge of the plate, so that the grinding wheel produces the bevel in the intended manner.

[0004] In solutions of the prior art, the edging unit is generally constituted by an oscillating arm which supports a single grinding wheel and is pushed by way of elastic means against the front edge of the incoming plate; then the plate, as it continues its translation movement, in practice moves the arm so that the rollers engage the longitudinal edge until, once they have arrived at the rear edge, the grinding wheel must be advanced, together with the plate, so as to follow the working of the edge.

[0005] For this purpose, the oscillating arm is mounted on a movable unit which follows the passing plate for a certain length until the rear edge has been worked.

[0006] In the solutions of the prior art, therefore, a single grinding wheel is provided being supported by an oscillating arm which also supports the grinding wheel actuation motor, which is usually axially aligned with the grinding wheel.

[0007] With this type of edging unit, the advancement speed of the plate has to be reduced, since the grinding wheel has to follow the plate along a certain length during the working of the rear edge.

[0008] It is further necessary to keep a certain distance between the contiguous plates since, once a rear edge has been worked, the arm and the associated grinding wheel must return to the initial condition so as to engage the front edge of the next plate.

[0009] In addition to a reduced operating speed, the moving masses involved are relatively large, and it is necessary to move the grinding wheel with the corresponding actuation motor; accordingly, impacts can occur which damage the plate.

[0010] The aim of the invention is to eliminate the above-mentioned drawbacks, by providing an edging unit applicable to machines for working the edges of plates in general and of glass plates in particular which allows to significantly increase the operating speeds by allowing to increase the advancement speed of the plates being worked.

[0011] Within this aim, an object of the invention is to provide an edging unit which allows to reduce the dis-

tance between two contiguous plates being worked, accordingly reducing idle times.

[0012] Another object of the present invention is to provide an edging unit which allows to significantly reduce the moving masses, thus allowing to apply lower pressures and reducing the impact that inevitably occurs when the plate makes contact with the grinding wheel; accordingly, the speed with which the glass makes contact with the grinding wheel can be much higher, with the advantage of higher productivity of the machine.

[0013] Another object of the present invention is to provide an edging unit which, thanks to its particular constructive characteristics, is capable of giving the greatest assurances of reliability and safety in use.

[0014] This aim and these and other objects which will become better apparent hereinafter are achieved by an edging unit applicable to machines for working the edges of plates particularly of glass plates, according to the invention, characterized in that it comprises, at at least one edge of a plate being worked, a first movable element and a second movable element which respectively support a first grinding wheel and a second grinding wheel, said movable elements being connected to actuation means in order to respectively move said first grinding wheel so that it acts on the front edge of said plate being worked and said second grinding wheel so that it acts on the rear edge.

[0015] Further characteristics and advantages will become better apparent from the description of a preferred but not exclusive embodiment of an edging unit applicable to machines for working the edges of plates particularly of glass plates, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a schematic view of the edging unit according to the invention, illustrating the two grinding wheels engaged with a plate;

Figure 2 is a partially sectional view of the movable elements with the corresponding actuators;

Figure 3 is a schematic plan view, taken from the rear side, of the edging unit, illustrating the grinding wheel actuation means;

Figure 4 is a sectional view, taken along the line IV-IV of Figure 3;

Figure 5 is a sectional view, taken along the line V-V of Figure 3.

[0016] With reference to the figures, the edging unit applicable to machines for working the edges of plates in general and glass plates in particular, generally designated by the reference numeral 1, is usually provided at the end of the production cycle of edging machines.

[0017] In the case of machines which work two opposite edges, with the plate arranged flat, two edging units are provided, one for each side, whereas in the case of machines which work one edge of a vertically arranged

plate a single edging unit is provided arranged vertically at the end of the working of such edge.

[0018] The edging unit has a first movable element 2 and a second movable element 3 which are advantageously provided by means of a first arm and a second arm which are mutually pivoted at a central shaft, designated by the reference numeral 4.

[0019] The movable elements respectively support, at their free end, a first grinding wheel 5 and a second grinding wheel 6 being arranged inside a conventional carousel element, generally designated by the reference numeral 10, which is provided by means of a rotating drum 11 which supports a plurality of rotating rollers 12 being distributed circumferentially so as to determine the coupling with the edge of a plate, designated by the letter L, with correct positioning with respect to the grinding wheel, which accordingly provides the bevel to the intended length.

[0020] The arms 2 and 3 can oscillate respectively by way of the action of a first actuator 20 and of a second actuator 21 which are constituted by a first double-acting cylinder 20 and by a second double-acting cylinder 21 which act respectively at the end of either arm.

[0021] The grinding wheels 5 and 6 are preset so that the first grinding wheel works the front edge of the plate L, while the second grinding wheel works the rear edge of the plate.

[0022] For this purpose, as shown schematically in Figure 1, the arms 2 and 3 are pushed toward the plate passage region; after the first grinding wheel has worked the front edge, the advancement of the plate causes the arm 2 to move away thanks to the fact that the rollers 12 engage the lateral edge of the plate.

[0023] Once the end of the plate has been reached, the second actuator, constituted by the second piston 21, pushes the second grinding wheel 6 so that it works the rear edge, without having to move the entire unit in order to follow the plate.

[0024] The arms 2 and 3 are divaricated and are pushed against the edge of the plate so as to work the edges according to a preset program.

[0025] It is noted that since it is not necessary to follow the plate during its translation movement, it is possible to achieve considerably higher operating speeds than in the prior art and it is further possible to leave a very small distance between two contiguous plates.

[0026] Another important aspect of the invention consists in that a fixed-position motor, designated by the reference numeral 30 is provided, such motor being supported by the frame of the machine and turns, by way of transmission means such as a first belt 31, a central pulley 32 which is arranged coaxially to the central shaft 4 and includes pulley regions on which a first transmission belt 35 and a second transmission belt 36 act; said belts respectively turn a first pulley 37 and a second pulley 38 which are keyed on the same respective supporting shafts as said first and second grinding wheels, supported at the carousel 10.

[0027] In this manner it is possible to turn the grinding wheels without having to arrange the motor coaxially to the grinding wheel as occurs in the prior art; in the described solution, the motor is connected to the frame of the machine and motion is transmitted by means of belts, so that the moving masses are very small, thus allowing to have low pressure for the actuation of the actuators, since the mass to be moved is small.

[0028] Moreover, since the moving mass is small, the impact is reduced considerably and it is therefore possible to increase operating speeds.

[0029] For the sake of completeness of description, it should also be added that a first belt tensioner and a second belt tensioner, both designated by the reference numeral 40, act respectively on the first and second belts 35 and 36.

[0030] It should also be added that in order to vary the axial position of the grinding wheels with respect to the glass plate, for the purpose of providing uniform grinding wheel wear and of positioning plates having different thicknesses in different points of the grinding wheel, the entire unit can be moved parallel to the axis of the grinding wheels.

[0031] According to a further embodiment, the unit is connected to the fixed frame of the machine by means of a slider 50 and a handwheel 51 is provided, to actuate a threaded stem 52 which engages a seat formed by the edging unit.

[0032] From the above description it is thus evident that the invention achieves the intended aim and objects, and in particular the fact is stressed that an edging unit is provided which, by using two separate grinding wheels for working the front edge and the rear edge, allows to increase operating speeds considerably, since the grinding wheel does not have to follow the plate during the working of the rear edge as instead occurs in the known art.

[0033] Another important aspect consists in that the drastic reduction in moving masses allows to further increase speed without the danger of damaging impacts between the grinding wheel and the glass plate.

[0034] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0035] All the details may further be replaced with other technically equivalent elements.

[0036] In practice, the materials used, as well as the contingent shapes and dimensions, may be any according to requirements.

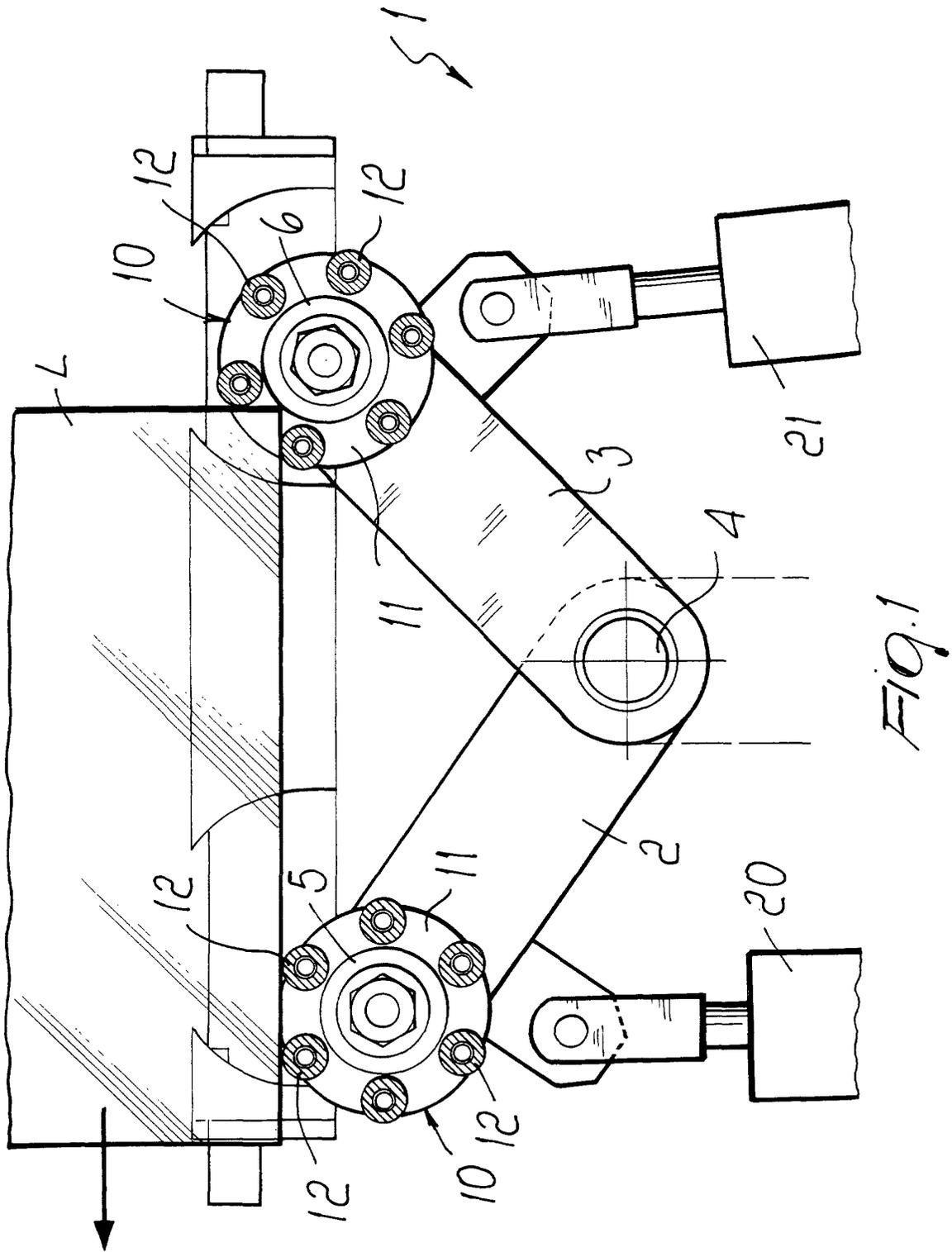
[0037] The disclosures in Italian Patent Application No. MI2000A001617 from which this application claims priority are incorporated herein by reference.

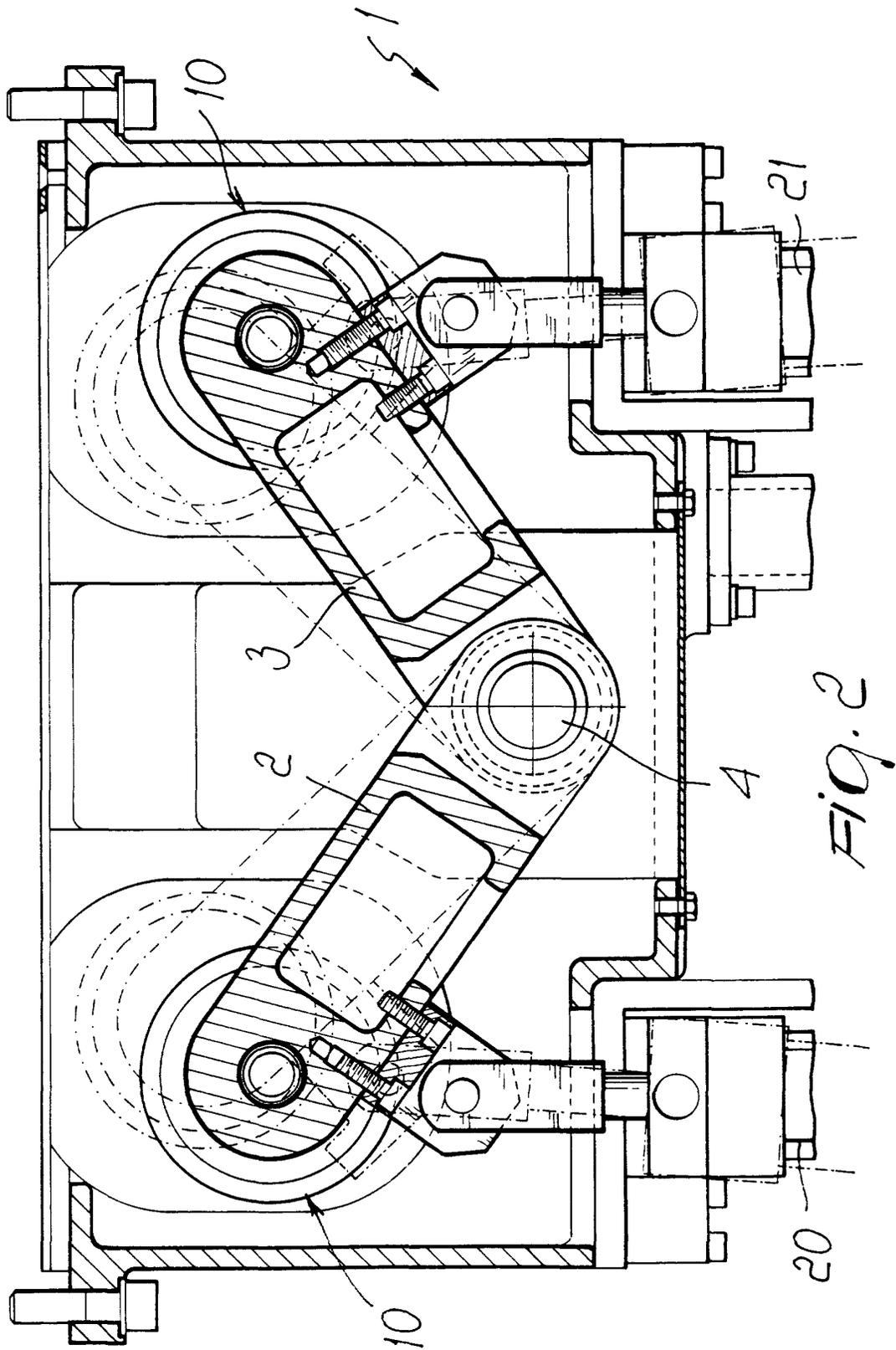
[0038] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of

example by such reference signs.

Claims

- 5
1. An edging unit applicable to machines for working the edges of plates, particularly of glass plates, **characterized in that** it comprises, at least one edge of a plate (L) being worked, a first movable element (2) and a second movable element (3) which respectively support a first grinding wheel (5) and a second grinding wheel (6), said movable elements (2,3) being connected to actuation means (20,21) in order to respectively move said first grinding wheel (5) so that it acts on the front edge of said plate (L) being worked and said second grinding wheel (6) so that it acts on the rear edge. 10 15
 2. The edging unit according to claim 1, **characterized in that** said first and second movable elements comprise a first arm (2) and a second arm (3) which are mounted so that they can oscillate, moving toward or away from the edge of said plate (L). 20
 3. The edging unit according to one or more of the preceding claims, **characterized in that** said first (2) and second (3) arms are pivoted to a central shaft (4). 25
 4. The edging unit according to one or more of the preceding claims, **characterized in that** said actuation means are constituted by a first cylinder (20) and a second cylinder (21) which act respectively at the ends of said first (2) and second (3) arms. 30 35
 5. The edging unit according to one or more of the preceding claims, **characterized in that** it comprises a motor (30) for actuating said first (5) and second (6) grinding wheels which is supported by the frame of the machine. 40
 6. The edging unit according to one or more of the preceding claims, **characterized in that** it comprises transmission means (51) for connecting said motor (30) to a central pulley (32) which is coaxial to said central shaft (4), pulley regions being formed at said central pulley (32) for actuating a first transmission belt (35) and a second (36) transmission belt which are connected to a first pulley (37) and a second pulley (38) which are keyed on the supporting shafts of said first and second grinding wheels, respectively. 45 50
 7. The edging unit according to one or more of the preceding claims, **characterized in that** it comprises means for moving said edging unit (1) along a direction which is substantially parallel to the axes of said grinding wheels (5,6). 55





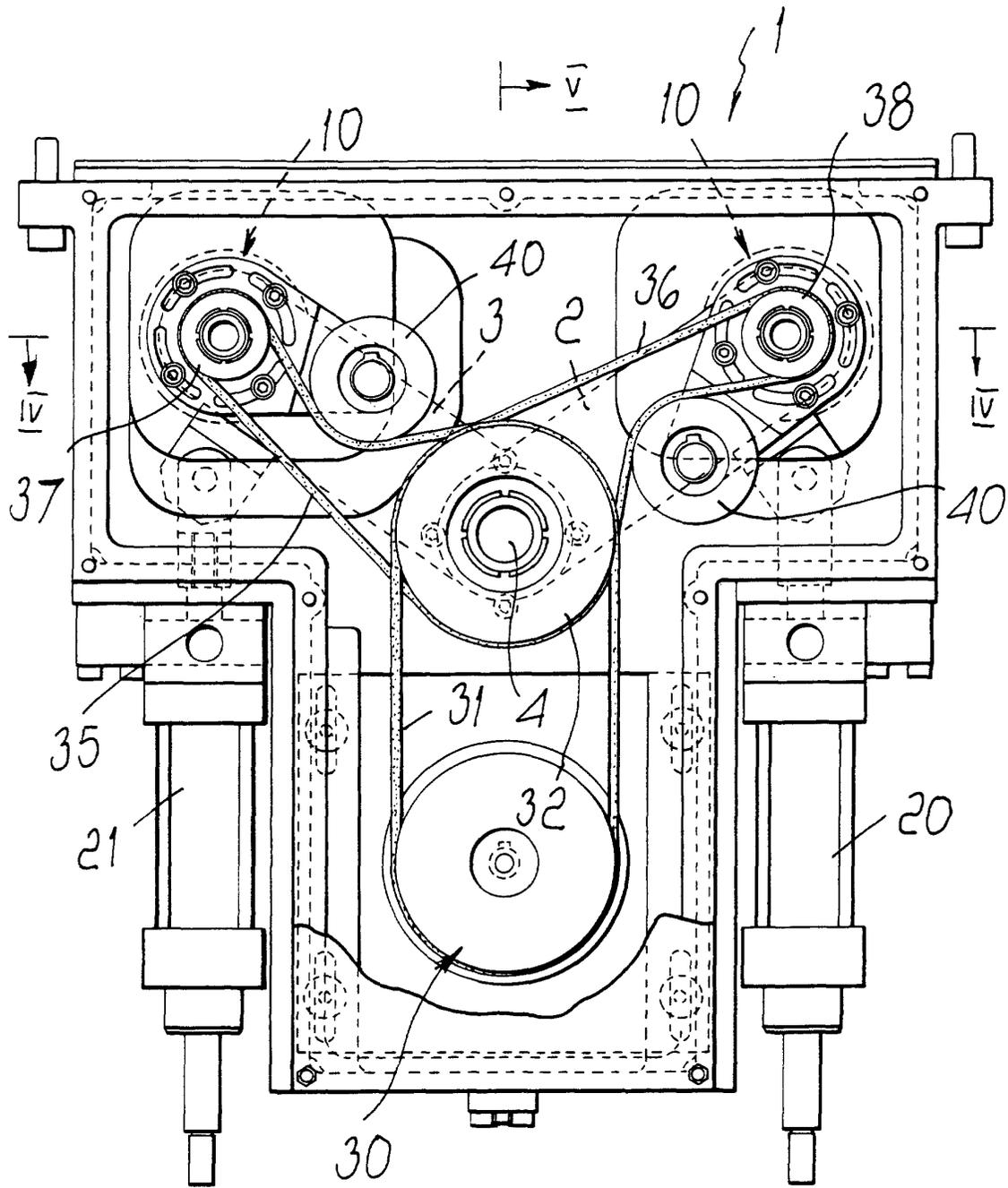
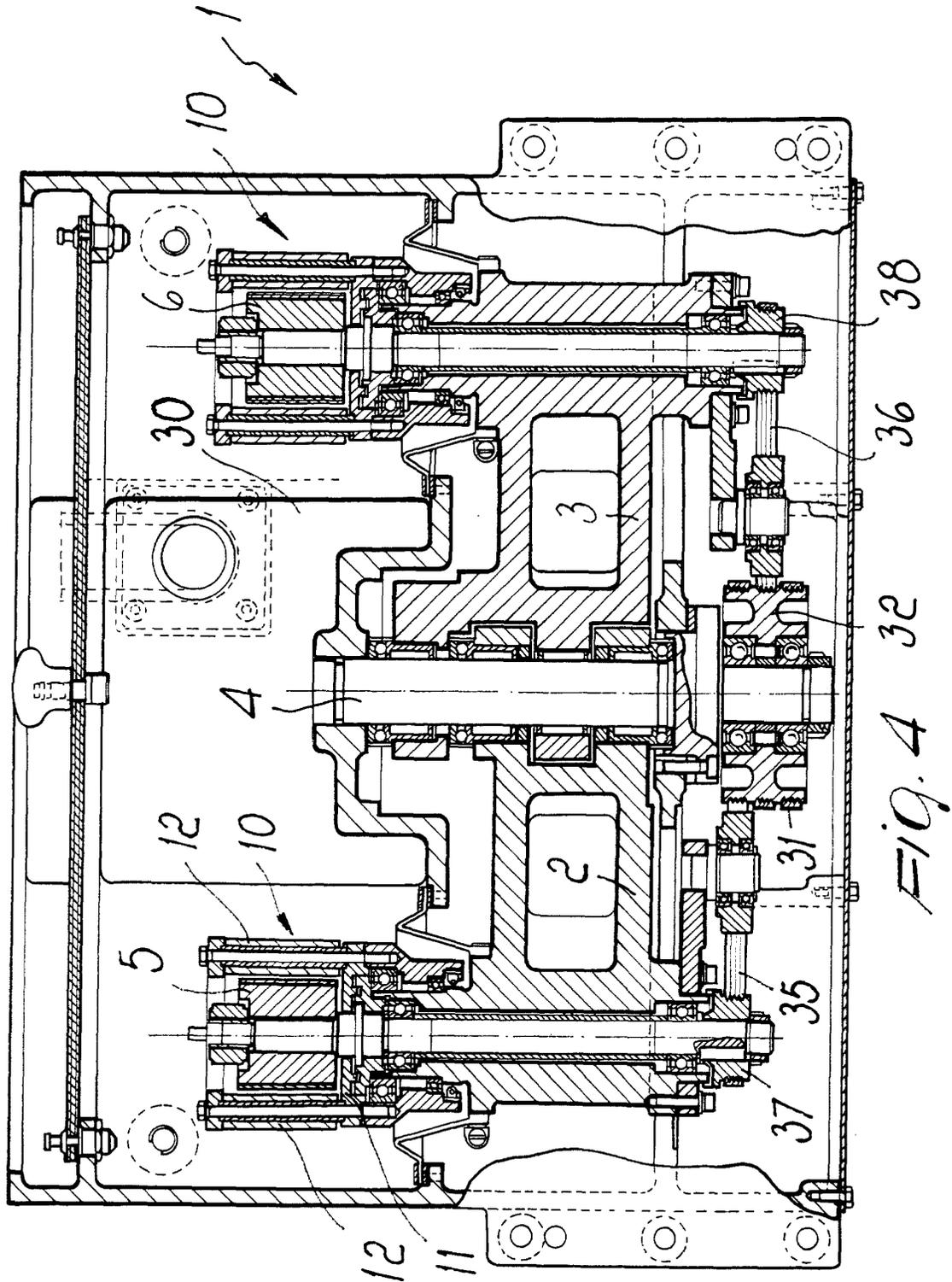
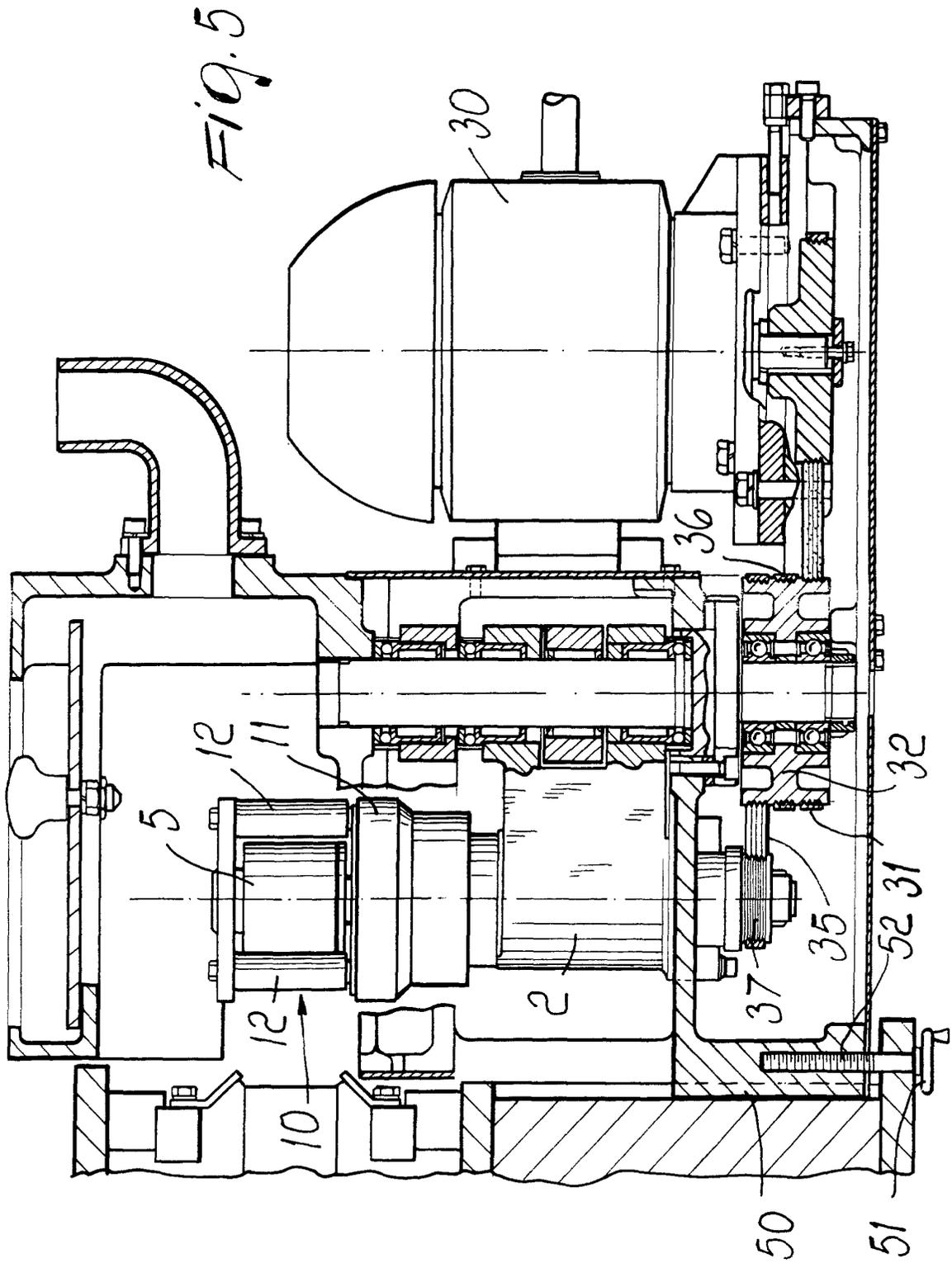


FIG. 3







European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 11 4788

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.7)
X	US 3 928 945 A (DEVILLERS) 30 December 1975 (1975-12-30) * column 3, line 3 - column 4, line 2; figure 5 *	1,2	B24B9/10 B24B41/04 B24B27/00
A	DE 22 06 768 A (DELOG DETAG FLACHGLAS AG) 16 August 1973 (1973-08-16) * page 5, last paragraph *	4	
A	EP 0 673 715 A (BANDO KIKO CO) 27 September 1995 (1995-09-27) * column 10, line 6 - line 36 *	7	
A	DD 46 419 A (SCHMIDT) * column 2, line 25 - column 3, line 26 *	1	
A	GB 2 261 433 A (KABUSHIKIGAISSYA FUKUYAMATRAKKOU) 19 May 1993 (1993-05-19) * abstract *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B24B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		9 October 2001	Garella, M
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 03/92 (P/04001)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 01 11 4788

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.

09-10-2001

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 3928945	A	30-12-1975	FR 2258767 A5	18-08-1975
			FR 2273627 A2	02-01-1976
			BE 823580 A1	16-04-1975
			DE 2460559 A1	10-07-1975
			GB 1486628 A	21-09-1977
			IT 1023816 B	30-05-1978
			JP 50097992 A	04-08-1975
DE 2206768	A	16-08-1973	DE 2206768 A1	16-08-1973
EP 0673715	A	27-09-1995	WO 9414570 A1	07-07-1994
			EP 0673715 A1	27-09-1995
DD 46419	A		NONE	
GB 2261433	A	19-05-1993	JP 1981521 C	25-10-1995
			JP 5016063 A	26-01-1993
			JP 7014585 B	22-02-1995
			BE 1007127 A3	04-04-1995
			KR 237507 B1	01-04-2000

EPC FORM P/459

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