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(54) **Safety apparatus for circular saws**

(57) A safety apparatus for circular saws, comprising a safety hood (6) and an articulated parallelogram (1) for the vertical displacements of the safety hood (6), in which the articulated parallelogram (1) identifies a plane (8) with respect to which the cutting line of the circular saw (9) is incident. The articulated parallelogram (1) comprises two rocker arms (2,3) and two connecting rods (4,5), much shorter than the rocker arms (2,3), so

that a deformation of the articulated parallelogram (1) determines negligible horizontal displacements of the safety hood (6) of the circular saw (9). In particular, the upper rocker arm (2) is hollow and connected at an end (2a) directly to a central area (6a) of the safety hood (6), in such a way as to be used also for dust aspiration.

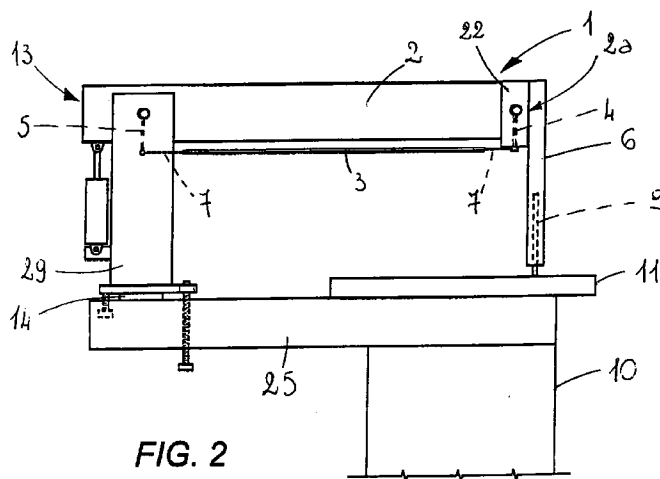


FIG. 2

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Description

The present invention relates to a safety apparatus for circular saws.

Both in building yards and in workshops, wherever the use of circular saws is widespread, safety regulations mandate the use of special protections to safeguard personnel tasked with operating such machines against injury.

The primary purpose of these protections, comprising a hollow hood, is to cover the blade, while it operates, whether it protrudes perpendicularly from the work plane or it does so obliquely. Moreover, the protections must be able to move in such a way as to adapt to the height of the piece to be worked.

Of particular importance, therefore, is the way in which protections for circular saws are moved: the most frequently used device comprises an articulated parallelogram essentially coplanar with the cutting line of the saw or parallel thereto, whose deformation causes mainly a vertical displacement of the protection. However, by the very nature of the articulated parallelogram, this movement will also be accompanied by a horizontal displacement of the protection in the same direction as the cutting line. This displacement, inversely proportional to the length of the rocker arms, and thus the greater the closer the sizes of connecting rods and rocker arms in the articulated parallelogram, entails an overall disadvantageous overdimensioning of the protection.

Moreover, a moving system of this kind requires the use of numerous pivots which must be accomplished with the smallest possible amount of backlash, which creates considerable manufacturing challenges. The abundance of pivots and the backlash related thereto, which always adds up, lead to a poor rigidity of the protection device which vibrates when the saw is in operation.

Other solutions, much less widely used, provide for the saw protection to be able to rotate with respect to a pivot lifted over the work plane and located, with respect to the saw, in the area opposite the one where the operator introduces the piece to be worked. In this case, insertion of the piece brings about a lifting of the forward end of the protection which lowers again when the saw is in operation, moving back to parallel the work plane, thanks to its ability to swivel with respect to a second pivot located in the front part of the protection. The limitations of this device are connected with the impossibility to use it when the saw must operate in a direction that is not orthogonal to the work plane, unless protections with very wide hoods are used.

More recently, and only in a few cases, motion devices have been employed which exploit a telescopic arm also to displace the safety hood in height. However, the complexity of the device is such that no satisfactory operation has yet been reached.

Apparatuses of this kind also comprise a device for

aspirating the dust produced when the circular saw is in operation.

This device comprises a flexible arm, inserted in the rear area of the safety hood, wherein the dust is aspirated and whence it is discharged into an appropriate container.

The object of the present invention therefore is to eliminate the drawbacks mentioned above. The invention, as it is characterised by the claims, essentially solves the problems of the displacements of the circular saw in the direction of the cutting line.

The main advantage obtained through the present invention essentially consists of the fact that the overall size of the machine remains unchanged with respect to the ones already in use, nor is the size of any of its parts increased, but on the contrary a significant reduction of the required components is obtained. This entails a simpler manufacture and a more reliable operation. In particular, an additional important advantage stems from the fact that the invention is much more stable and less prone to vibrate when the saw is in operation.

Lastly, the dust aspiration device presents a greater efficiency and ease of manufacturing, being integrated with the motion system of the protection.

The invention is described more in detail in what follows with the aid of drawings which show an embodiment provided purely by way of non limiting example, in which:

- Figure 1 shows the invention in a top plan view;
- Figure 2 shows the invention in a side view;
- Figures 3, 4 and 5 show constructive details of the invention.

As can be observed in the figures, the present invention relates to a safety apparatus for circular saws.

Figure 1 shows an equipped machine (20) in which one can distinguish a base (10) and a work plane (11): to a side of the base (10) is fastened the apparatus (21) for the protection of circular saws (9) by means of a supporting arm (25). The protection apparatus (21) comprises a safety hood (6), an articulated parallelogram (1) to move it vertically, according to the dimensions of the piece to be worked, and a dust aspirating device (13). The articulated parallelogram (1), comprising a pair of rocker arms (2,3) and a pair of connecting rods (4,5), identifies a plane (8) with respect to which the cutting line of the circular saw (9) is incident. Numerous advantages are thus obtained: in the first place, the connecting rods (4,5), much shorter than the rocker arms (2,3), are distanced as far as possible so that a deformation of the articulated parallelogram (1) renders negligible the horizontal displacements of the safety hood (6) of the circular saw (9).

Moreover, the rocker arms (2,3) are able effectively to replace the traditional telescopic support to the safety hood (6) and to integrate the dust aspiration device (13).

It is advisable for the relative inclination of the plane

(8) identified by the articulated parallelogram (1) with respect to the cutting line of the circular saw (9) to lie between 60 and 90°: in particular, the non-perpendicular solution is preferable when the safety apparatus (21) is not to be fastened to the side opposite the working side. As can be seen in Figure 1, in this case the end of the safety apparatus (21) opposite the hood (6) is aligned with the side of the base (10) and makes it extremely simple to realise the supporting arm (25).

To make the entire structure as rigid as possible, the connecting rods (4,5) are constrained to the lower rocker arm (3) with flat springs (7), in such a way as to minimise backlash between the elements of the articulated parallelogram (1).

When the latter is deformed, the flat springs (7) flex by a few degrees, with angular travel that is the more reduced the greater the length of the rocker arms (2,3).

The upper rocker arm (2) instead comprises a hollow tube with an end (2a) leading inside the safety hood (6): this allows to use it also for aspirating and removing the dust produced by the circular saw (9). For this to occur in the most effective possible manner, the end (2a) of the rocker arm (2) is led to a central area (6a) of the safety hood (6), where dust production is greatest.

When, as in the case shown, the upper rocker arm (2) is large, the connecting rods (4,5) may even be physically suppressed, since their function is performed by a support (29) of the articulated parallelogram (1) and by an insertion (22) of the safety hood (6) on to the upper rocker arm (2).

As mentioned previously, the invention does not use a telescopic arm to move the safety hood (6) from its working position. In its place, a rotation pivot (14) has been used, integral with the supporting arm (25) in the opposite end to the one in which the base is set (10). Outside the rotation pivot (14), the support (29) of the articulated parallelogram (1), to which it is rotatably constrained in correspondence with the upper rocker arm (2), makes its rotation possible, being itself free to rotate with respect to the rotation pivot (14).

The support (29) also allows to house, as shown in Figures 3 and 4, a height adjusting device (15) and a calibration device (16) for positioning the safety hood (6) in place. The former may present an automatic control, alternative to manual positioning of the safety hood (6), which comprises a sensor (23) integral with the safety hood (6) and a piston (24) integral with the support (29). The sensor (23) measures the height of the piece to be worked and actuates the piston (24) to position the safety hood (6) properly.

The latter comprises a rod (17) able to slide vertically and a complementary slot (26) integral with the support (29) of the articulated parallelogram (1).

A device (18) for controlling and regulating the inclination of the safety hood (6) comprises a pivot (19) linking the rear connecting rod (5) and the upper rocker arm (2), fixed at an end and able to be positioned at the other so as to guarantee parallelism between the safety

hood (6) and the work plane (11).

Lastly, figure 5 shows a friction device (27), comprising friction means (28) which, in the example shown, are metal disks locked between the upper rocker arm (2) and its support (29). When, by means of a handle (12), the safety hood (6) is moved, they guarantee that it remains in the attained position.

Claims

1. Safety apparatus for circular saws, comprising a safety hood (6) and an articulated parallelogram (1) for the vertical displacements of the safety hood (6), characterised in that said articulated parallelogram (1) identifies a plane (8) with respect to which the cutting line of the circular saw (9) is incident.
2. Safety apparatus according to claim 1, characterised in that said articulated parallelogram (1) comprises a pair of rocker arms (2,3) and a pair of connecting rods (4,5) of such size that the connecting rods (4,5) are so distanced, that a deformation of the articulated parallelogram (1) renders negligible the horizontal displacements of the safety hood (6) of the circular saw (9).
3. Safety apparatus according to claim 1 or 2, characterised in that the plane (8) identified by the articulated parallelogram (1) is perpendicular to the cutting line of the circular saw (9).
4. Safety apparatus according to claim 1 or 2, characterised in that the cutting line of the circular saw (9) has an acute angle of incidence exceeding 60° with respect to the plane (8) identified by the articulated parallelogram (1).
5. Safety apparatus according to claim 1 or 2, characterised in that it comprises a fixed rotation pivot (14) and a support of the articulated parallelogram (1) that is free to rotate about the rotation pivot (14), so as to displace the safety hood (6) from its operating position.
6. Safety apparatus according to claim 2, characterised in that the connecting rods (4,5) are constrained to the lower rocker arm (3) with flat springs (7), in such a way as to reduce backlash between the elements of the articulated parallelogram (1).
7. Safety apparatus according to claim 2 or 3 or 4, comprising a device for aspirating dust (13), characterised in that said dust aspiration device (13) comprises the upper rocker arm (2), hollow and having an end (2a) leading inside the safety hood (6).
8. Safety apparatus according to claim 7, character-

ised in that the end (2a) of the upper rocker arm (2) is led to the safety hood (6) in a central area (6a) where dust production is greatest.

9. Safety apparatus according to claim 2, characterised in that it comprises a device (18) for controlling and regulating the inclination of the safety hood (6). 5

10. Safety apparatus according to claim 9, characterised in that said control and regulation device (18) 10
comprises a linking pivot (19) between the rear connecting rod (5) and the upper rocker arm (2), which can be rotated by hand to induce rotations of the safety hood (6). 15

11. Safety apparatus according to claim 5, characterised in that said support (29) comprises a height adjustment device (15). 20

12. Safety apparatus according to claim 11, characterised in that the height adjustment device (15) comprises a sensor (23) integral with the safety hood (6) and a piston (24) integral with the support (29) of the articulated parallelogram (1), said sensor (23) being able to measure the height of the piece 25
to be worked and to actuate said piston (24). 30

13. Safety apparatus according to claim 5, characterised in that it comprises a calibration device (16) for positioning the safety hood (6) in place. 35

14. Safety apparatus according to claim 13, characterised in that said calibration device (16) comprises a rod (17) able to slide vertically and a complementary slot (26) integral with the support (29) of the articulated parallelogram (1). 40

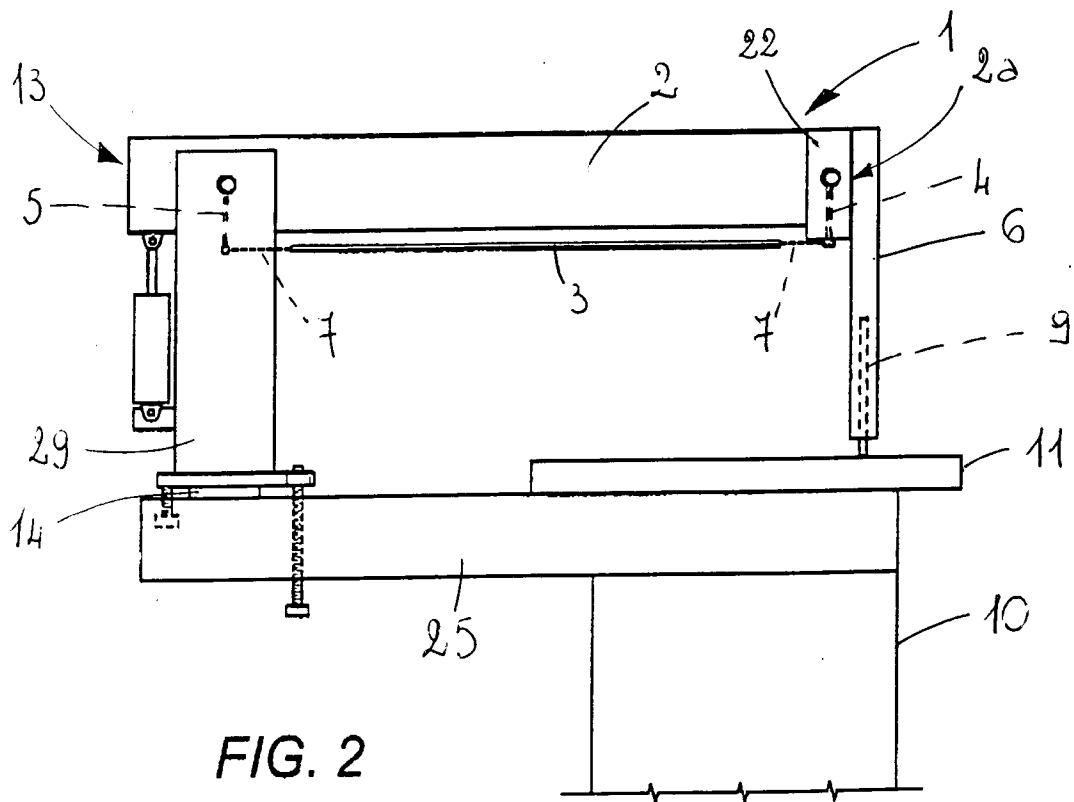
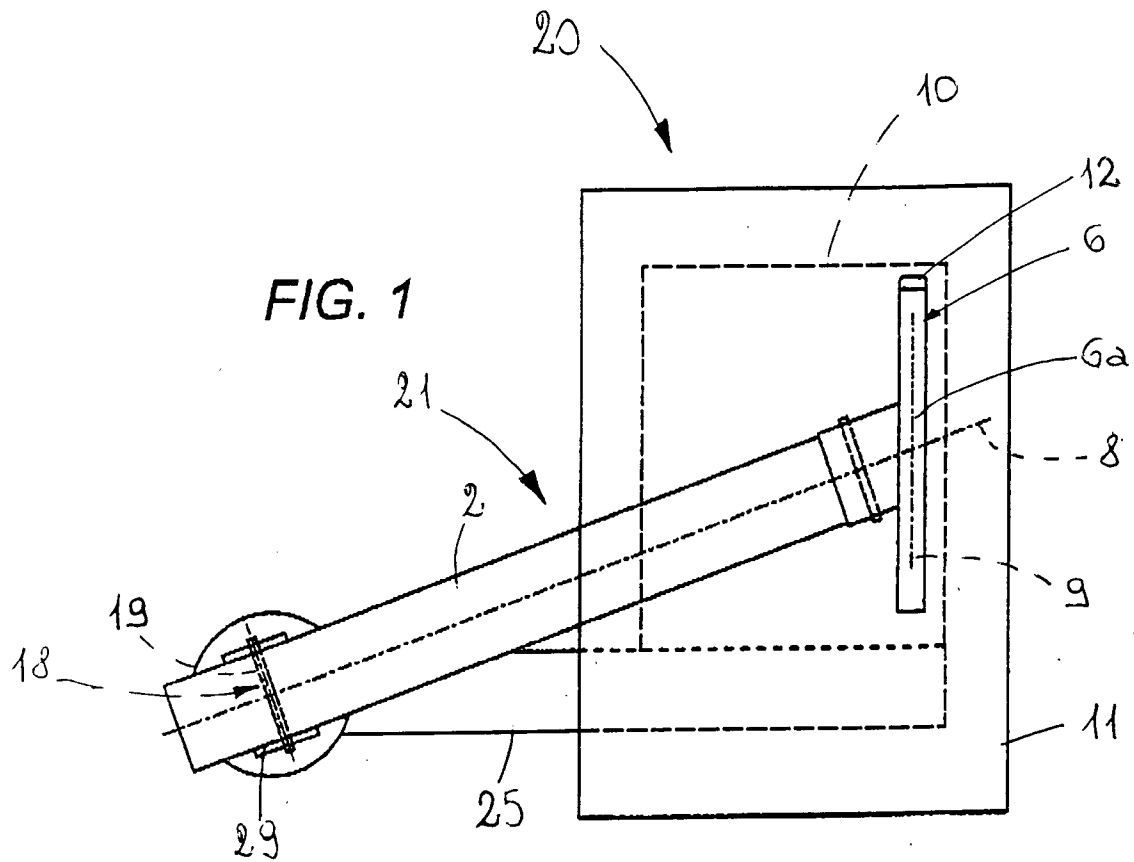
15. Safety apparatus according to claim 5, characterised in that it comprises a friction device (27) between the upper rocking arm (2) and the support (29), able to maintain the safety hood (6) in position. 45

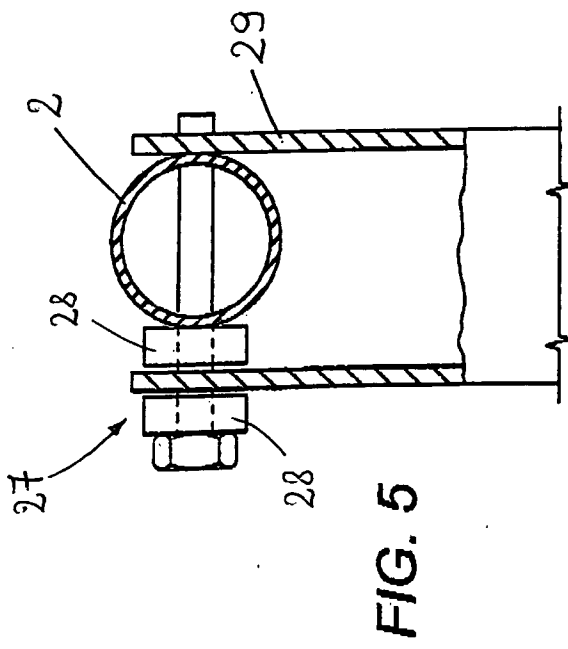
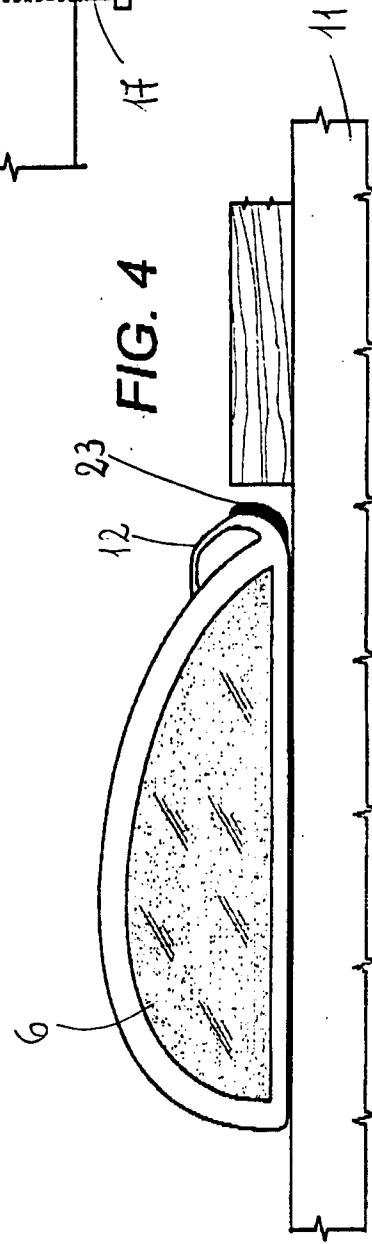
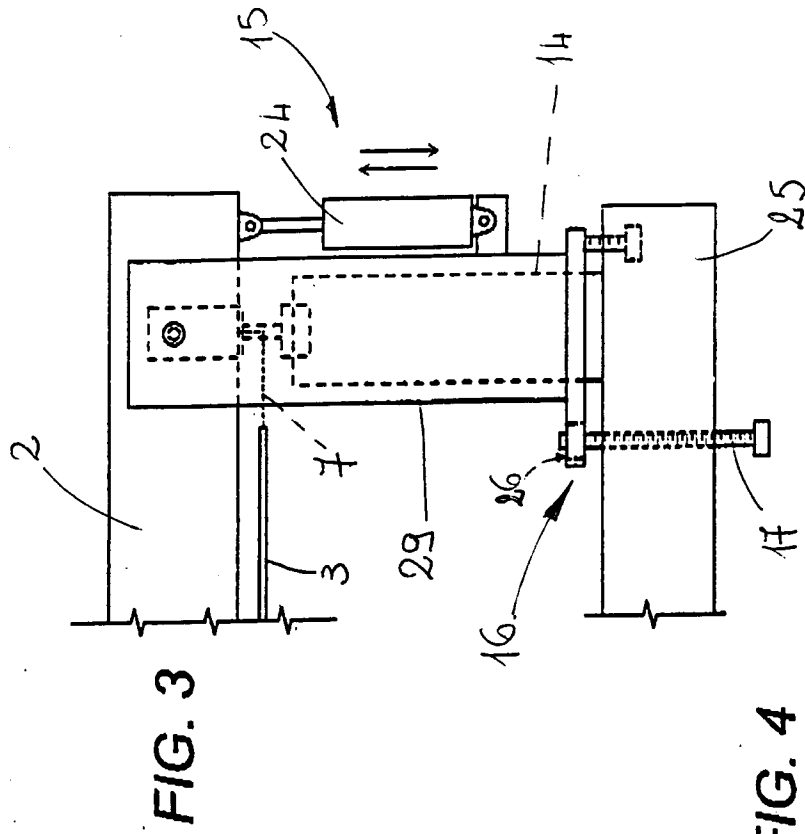
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EUROPEAN SEARCH REPORT

Application Number
EP 97 83 0236

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)
A	US 4 403 534 A (ALTENDORF KURT ET AL) 13 September 1983 * column 1, line 6 - line 20 * * column 2, line 44 - line 54 * * column 3, line 48 - column 4, line 15; figures *	1,2,7,8	B27G19/02
A	DE 43 16 586 A (OTTO MARTIN MASCHINENBAU GMBH) 24 November 1994 * abstract; figures *	7,11,12	
A	EP 0 489 397 A (SCHWEIZERISCHE UNFALLVERSICHER) 10 June 1992 * column 4, line 29 - line 52; figure 5 *	15	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B27G
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		6 October 1997	Huggins, J
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