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(54) **Improved wet grinder**

(57) A wet grinder includes a supporting shell made of a substantially rigid material that internally accommodates a cylindrical grinding wheel (12) that protrudes partially outside and is connected to an electric motor (8) by a mechanical transmission (13) that includes at least one elastic toothed belt (22, 26). The belt is made of thermoplastic uniform elastomeric material without a core of inextensible material. The transmission is of the two-stage type, in which each stage is constituted by a pair of toothed pulleys that are mutually coupled by an elastic toothed belt (22, 26). The shafts of the pulleys are made of antifriction, self-lubricating plastics and are supported by respective pivots (20, 27) that are inserted in seats (21, 28) of the supporting shell (2) without interposing bushes or bearings. The grinder is very cheap and silent, and the elastic toothed belts allow to compensate for considerable variations in plays and for wide center distance tolerances.

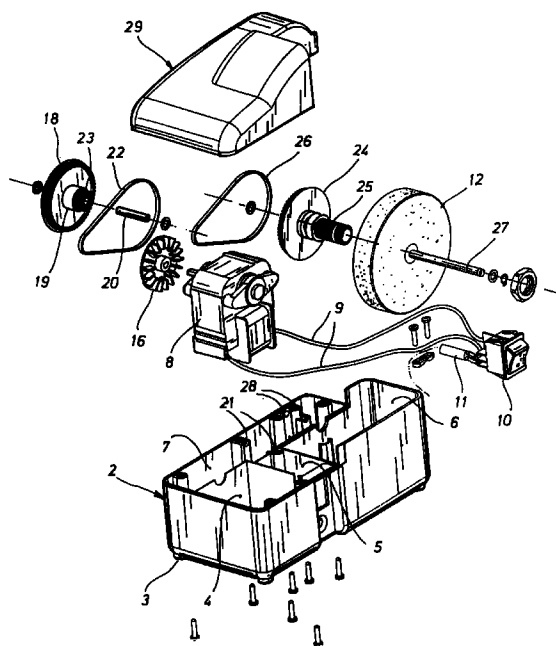


FIG. 5

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Description

The present invention relates to an improved wet grinder, particularly for home and workshop use.

Conventional wet grinders that are currently commercially available are generally formed by a supporting structure made of substantially rigid material that internally accommodates a cylindrical grinding wheel that partially protrudes outside and is connected to an electric motor through a mechanical transmission.

The transmissions used for these grinders are usually constituted by straight-tooth gears, helical gears, or worm gears. Accordingly, if one wishes to achieve an acceptable efficiency and a limited noise, it is necessary to provide rather tight tolerances when assembling the gears. It may also be necessary to use expensive bushes, which must be constantly lubricated even in the vicinity of wet regions, such as the water tray of the grinder. If the supports wear, or if there are machining errors, the efficiency of these transmissions can drop considerably and the noise consequently increases. Finally, conventional grinders have a relatively high cost with respect to the performance and the efficiency that they deliver.

In order to reduce the noise, transmissions with smooth belts, having a trapezoidal cross-section and a core that is reinforced with nylon fibers or the like, have also been used. However, these belts are incapable of stretching and do not allow to change the distance between the axes of the gears, which therefore must have tight tolerances.

Furthermore, the smooth surfaces for contact between the pulleys and the belts are subject to slippages and do not allow to transmit considerable torques. To avoid such slippages it is therefore necessary to apply tension to the belts, which unavoidably causes a reduction in the efficiency of the transmission and higher wear on the supports of the shafts. Furthermore, higher-power motors must be used.

The aim of the present invention is to eliminate the drawbacks described above by providing an improved wet grinder that is more economical than prior ones for equal performance and efficiency.

Within the scope of this aim, a particular object is to achieve maximum simplification of the machining and assembly operations.

Another object is to provide a wet grinder having normal performance by using motors of limited power.

Another object is to provide a wet grinder that is extremely quiet, safe, clean, and very easy to maintain.

This aim, these objects, and others which will become apparent hereinafter are achieved by a wet grinder of the type defined in the introduction, characterized in that the mechanical transmission includes at least one elastic toothed belt.

The belt can be made of uniform thermoplastic elastomeric material without a core of inextensible material.

In this manner, the tolerances between the center distances can be increased, since they are easily compensated by the elasticity of the belts. This entails a considerable saving in the operations for machining the supports of the pulleys and simplification of the assembly operations.

Furthermore, the teeth of the belts allow optimum slip-free torque transmission, increasing the efficiency of the transmission itself, allowing the use of less powerful motors and no longer requiring the use of bushes and bearings on the pulley shafts.

Furthermore, the elasticity of the belt causes the operation of the grinder to be very silent and pleasant for the user, making it particularly suitable for use in a small environment, such as the home and the workshop.

The substantially complete use of plastic materials for the various components makes lubrication superfluous and therefore reduces maintenance costs.

Further characteristics and advantages will become apparent from the detailed description of a preferred but not exclusive embodiment of a wet grinder according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a general perspective front elevation view of the grinder according to the invention;

Figure 2 is a perspective rear elevation view of the grinder of Figure 1, with the lid removed to show its internal structure;

Figure 3 is a side view of the grinder of Figures 1 and 2;

Figure 4 is a plan view of the grinder of the preceding figures;

Figure 5 is an exploded perspective view of the grinder according to the invention.

With reference to the above figures, the wet grinder according to the invention, generally designated by the reference numeral 1, includes a supporting structure formed by a lower casing, or shell, 2 that is obtained by molding or injection of thermoplastic materials. Shell 2 has side and bottom walls, having an approximately prism-like shape, and lower resting feet 3.

The shell has longitudinal and transverse vertical dividing walls that form, inside the shell, four compartments 4, 5, 6, and 7 that are mutually independent and isolated.

Compartment 4 accommodates an electric motor 8 connected to a switch 10 by electric terminals 9. The switch is inserted in the watertight compartment 5 and can be connected to an external power outlet by a power supply cable 11.

The compartment, or tray 6, with a hermetic bottom for collecting cooling water, contains a cylindrical grinding wheel 12, whereas compartment 7 accommodates a transmission, generally designated by the reference numeral 13.

Advantageously, slots 14 and 15 are provided on the bottom of compartments 4 and 7 for the forced ventilation of motor 8, which is achieved by a fan 16, keyed on its shaft.

According to the invention, transmission 13 includes at least one toothed and elastic transmission belt.

In particular, the transmission is of the two-stage type. A first stage is constituted by a first toothed pulley 17, made for example of molded or injected plastic, which is keyed on the shaft of the motor 8. A second stage has a second pulley 18, which is also toothed and made of the same material and has a larger diameter than the first one. Second pulley 18 is rigidly coupled to a hollow shaft 19 mounted on a pivot 20. Pivot 20 is accommodated in seats 21 formed in the shell 2, as clearly shown in Figure 5.

Merely by way of example, the ratio between the diameters of pulleys 17 and 18, and therefore the transmission ratio of the pair, can be between 1:3 and 1:4.

The two pulleys are connected by a toothed belt 22 that has the same modulus, which can be for example 3 mm. Belt 22 can be made of elastomeric material, such as natural or synthetic rubber, with no internal core so that it can elongate elastically, by virtue of molding or injection processes.

The second stage of the transmission is constituted by a second reduction pair formed by a third toothed pulley 23, which is coaxial and rigidly coupled to the shaft 19 of the first pulley 17, and by a fourth toothed pulley 24 that is keyed to the shaft 25 of grinding wheel 12; the same remarks made for the first pair of pulleys 17 and 18 apply to this second pair.

In this case, too, pulleys 23 and 24 are connected by a toothed elastic belt 26 that is similar to the preceding one.

Shaft 25 of the grinding wheel is also hollow and is supported by a pivot 27 that is accommodated in seats 28 formed in shell 2.

By means of belts 22 and 26, the positioning tolerances of seats 21 and 28 for pivots 20 and 27 of the pulley shafts can be much greater than those of the prior art, with evident savings in machining and final assembly that positively affect the final cost of the electrical household appliance.

Shell 2 can be closed by an upper lid 29 that can be screwed or snapped on, ensuring the tightness of compartment 5 for electric switch 10 and an open compartment for grinding wheel 12.

Whereas pivots 20 and 27 can be made of steel, the pulleys and their shafts are made of antifriction, self-lubricating plastic to reduce friction, so as to avoid any action for lubrication and maintenance.

The wet grinder according to the invention is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept expressed by the claims that follow.

All the details may be replaced with technical equivalents, all of which are understood to be equally protected; the dimensions and the materials may be any according to the requirements, so long as they achieve the same final effect.

Claims

1. Wet grinder, comprising a supporting shell made of a substantially rigid material that internally accommodates a cylindrical grinding wheel (12) that protrudes partially outside, and an electric motor (8) that is connected to said grinding wheel by a mechanical transmission (13), characterized in that said mechanical transmission (13) comprises at least one elastic toothed belt (22, 26).
2. Wet grinder according to claim 1, characterized in that said elastic toothed belt (22, 26) is made of thermoplastic uniform elastomeric material without a core of inextensible material, so as to compensate considerable variations in plays and wide tolerances in center distances.
3. Wet grinder according to claim 1, characterized in that said transmission is of the two-stage type, each stage being constituted by a pair of toothed pulleys that are mutually coupled by an elastic toothed belt (22, 26).
4. Wet grinder according to claim 3, characterized in that the first pulley (17) of the first transmission pair is mounted on the shaft of the motor (8) and the second pulley (18) of the second transmission pair is keyed on the shaft (25) of the grinding wheel (12).
5. Wet grinder according to claim 4, characterized in that the second pulley (18) of the first transmission pair and the first pulley (23) of the second transmission pair are formed monolithically on an intermediate free shaft (19).
6. Wet grinder according to claim 5, characterized in that both said intermediate free shaft (19) and said grinding wheel-supporting shaft (25) are made of antifriction and self-lubricating plastic material and are supported by respective pivots (20, 27) that are inserted in seats (21, 28) of said supporting shell (2) without the interposition of bushes or bearings.
7. Wet grinder according to claim 1, characterized in that said shell (2) has side and bottom walls that have an approximately prismatic shape and is internally provided with longitudinal and transverse walls that are suitable to form separate compart-

ments (4, 5, 6, 7) respectively for said motor (8), for said switch (10), for said grinding wheel (12), and for said transmission (13).

8. Wet grinder according to claim 7, characterized in that said supporting structure comprises an upper lid (29) that can be detachably coupled to said lower shell (2) and is suitable to completely close said compartment (4) for the motor, said compartment (5) for the switch (10), and said compartment (7) for the transmission (13), and to leave said compartment (6) for the grinding wheel (12) uncovered.
9. Wet grinder according to claim 8, characterized in that some of said compartments (4, 7) have, on their bottom, ventilation slots (14, 15) for the motor.

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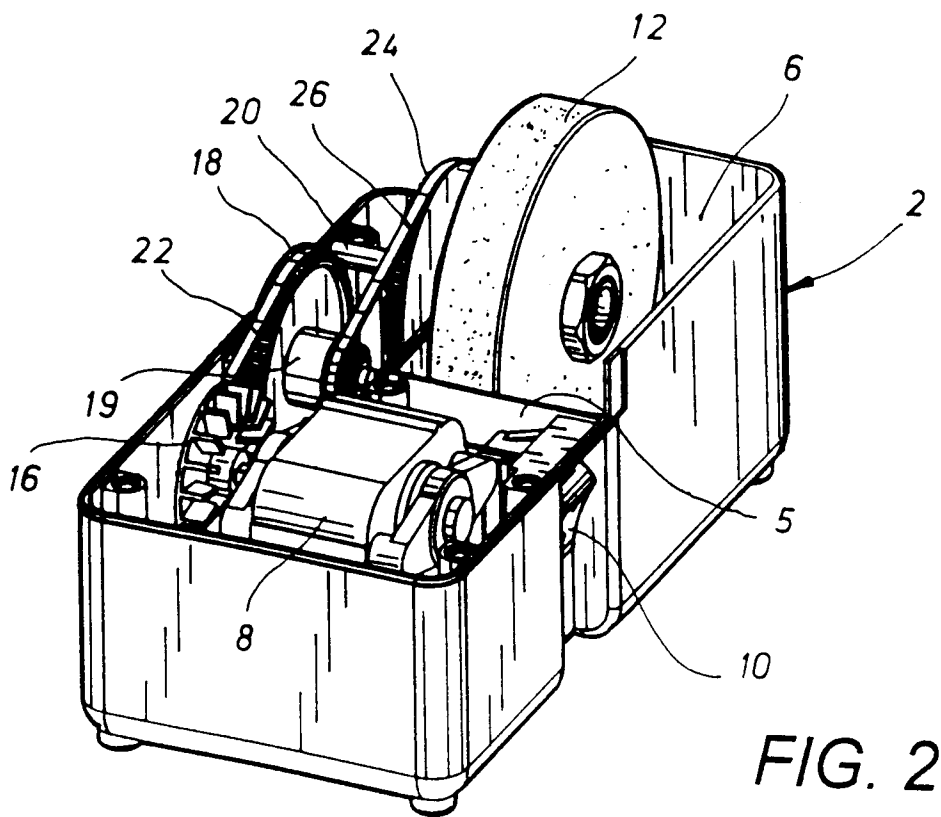
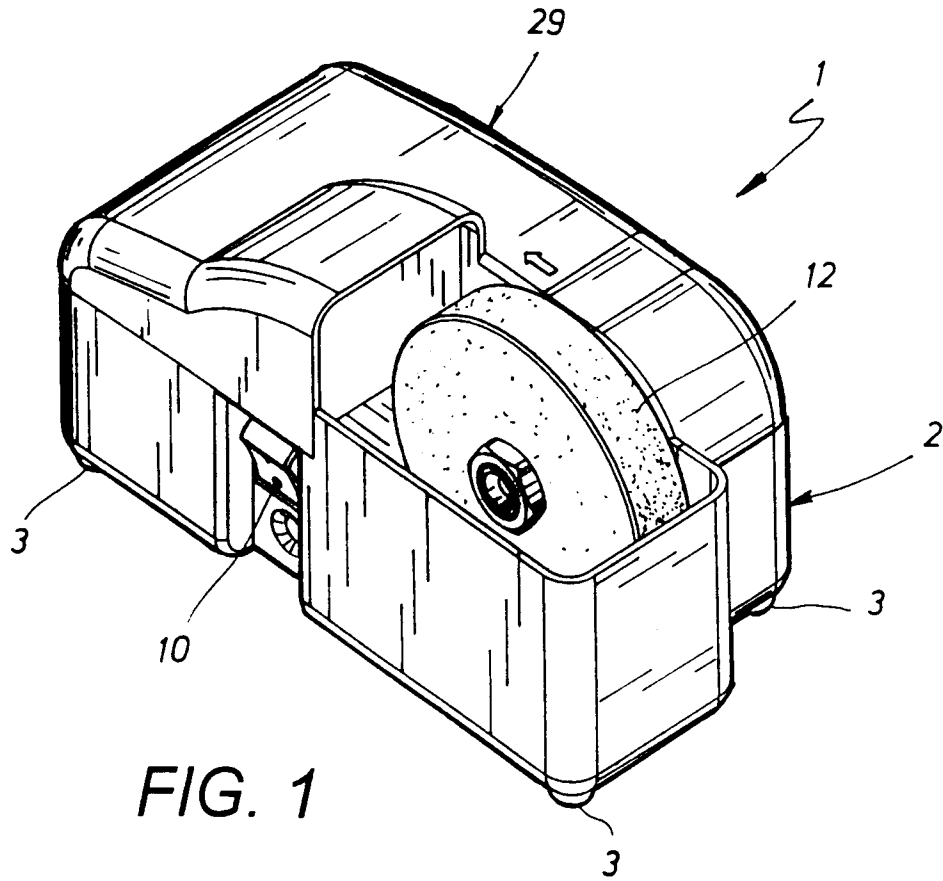
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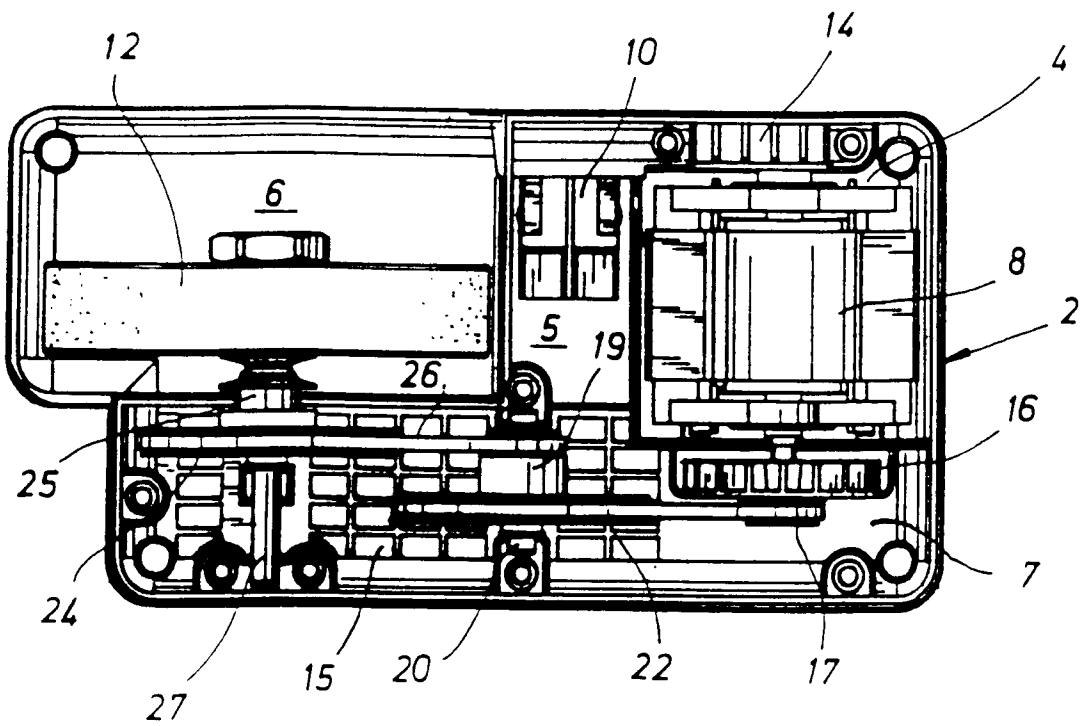
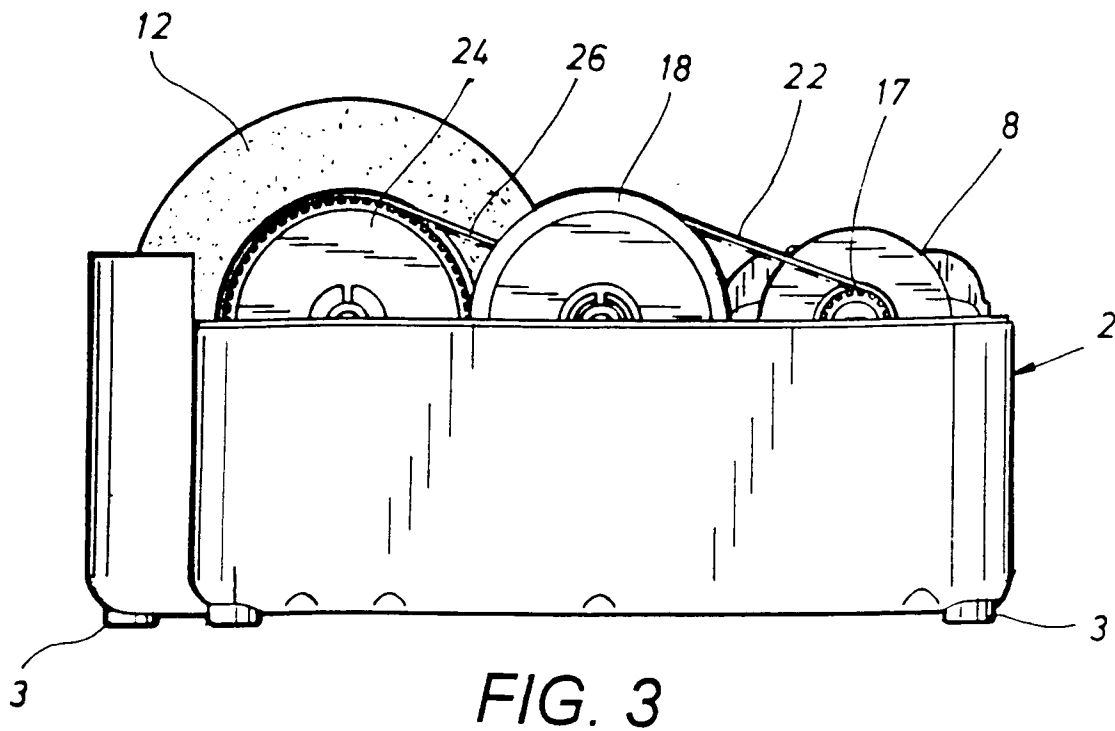
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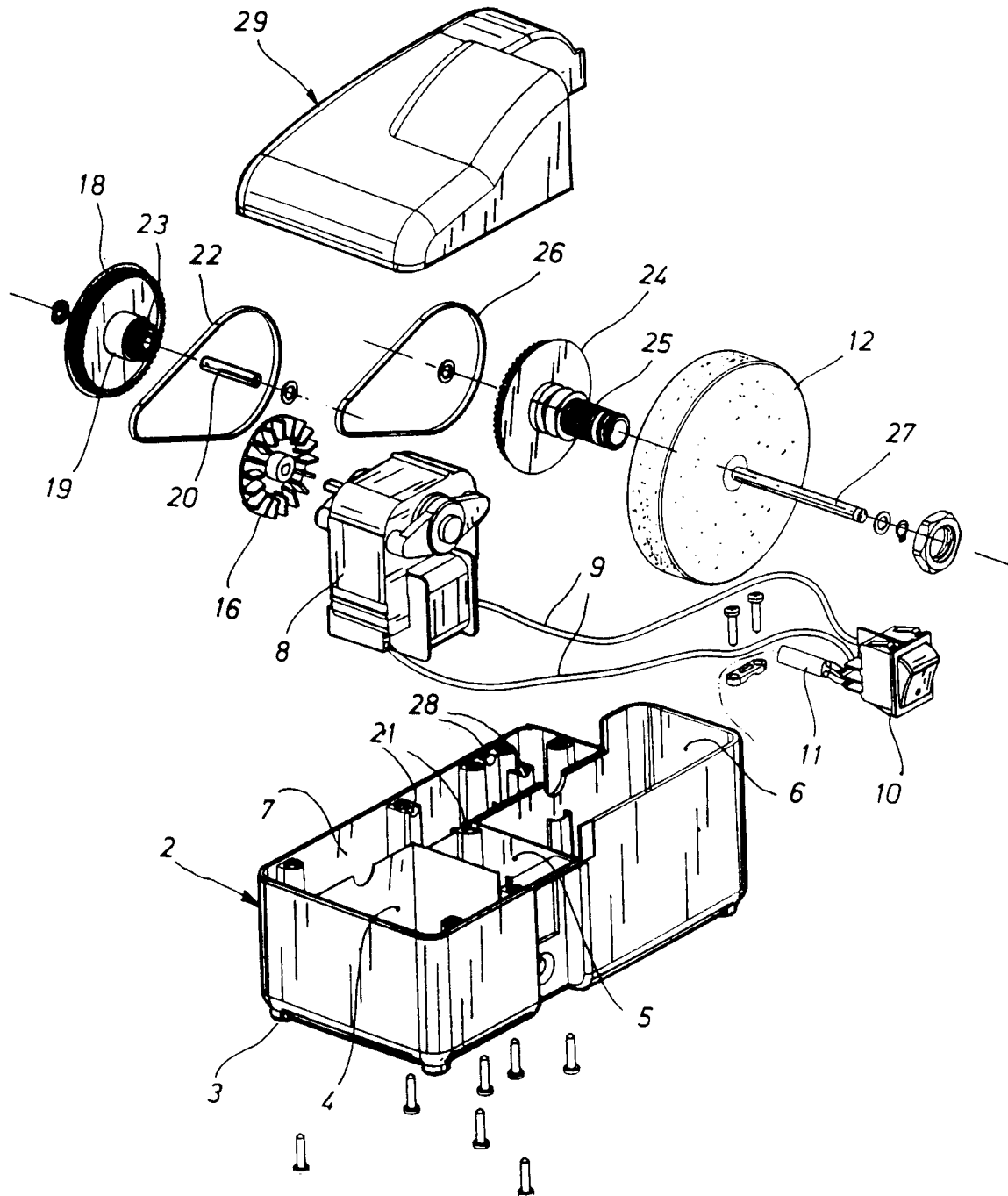


FIG. 5



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EUROPEAN SEARCH REPORT

Application Number
EP 96 10 0896

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)
Y	GB-A-2 046 145 (HANNING ELEKTRO WERKE) 12 November 1980 * page 2, line 20 - line 33; figures * ---	1,3-5,7	B24B3/52 B24B3/54 B24B47/12
Y	DE-U-77 27 096 (DICK) 8 December 1977 * page 10, line 4 - line 10; figures * ---	1,3-5,7	
A	DE-U-93 15 019 (ROBERT BOSCH GMBH) 2 February 1995 * page 6, line 4 - line 17 * ---	2	
A	FR-A-2 310 835 (STREICHER EMIDE METALL) 10 December 1976 * page 2, line 17 - line 28; figures * ---	8	
A	EP-A-0 591 109 (FAZZINI PATRIZIO) 6 April 1994 * abstract; figures * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B24B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 3 June 1996	Examiner Garella, M
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