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(54) **Two plane oscillating sander**

Oszillierendes Schleifgerät mit zwei Arbeitsebenen

Ponceuse vibrante à deux plans de travail

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Description

The present invention relates to a portable oscillating sander of the type including a housing and a sanding head adapted to be attached thereto so as to undergo oscillating relative rotation about a predetermined axis. A sanding head according to the preamble of claim 1 and a portable oscillating sander according to the preamble of claim 2 are known, for example, from EP-A-0 333 933.

Typically, sanders of the above type include a triangular sanding head, the lower surface of which is covered with abrasive material. The triangular shape of head enables the sander to be used for sanding into a corner. The sanding heads are detachable from the sander to enable their replacement either when they are worn out or when a coarser or finer abrasive is required.

Typically, the sanding heads taper from a largest cross-section corresponding to the sanding surface through decreasing cross-sections until the upper surface of the sanding head is reached. This enables the sanding surface to reach right into a corner, for example, unimpeded by the impingement of other regions of the sanding head on the workpiece. Such sanders are useful for sanding in one plane only.

It is an object of the present invention to provide a portable oscillating sander which is capable of sanding in two planes and also to provide a sanding head for such a sander.

Accordingly, the present invention provides a sanding head for a portable oscillating sander, adapted to be attached thereto so as to undergo oscillating relative rotation about a predetermined axis of the head, the sanding head including a substantially flat sanding surface substantially normal to the said axis and a second sanding surface formed by rotation of a line about an axis substantially coincident with the said predetermined axis.

The invention also provides a portable oscillating sander including a housing and a sanding head adapted to be attached thereto so as to undergo oscillating relative rotation about a predetermined axis, the sanding head including a substantially flat sanding surface substantially normal to the said axis and a second sanding surface formed by rotation of a line about an axis substantially coincident with the said predetermined axis.

It will be understood that the substantially flat sanding surface is the equivalent of the sanding surface discussed above with reference to existing portable sanders. The second sanding surface is preferably substantially part-conical, and is useful for sanding in a plane lying at an angle to the substantially flat sanding surface, since it is substantially concentric with the oscillating motion of the head. The motion of a point on the substantially part-conical sanding surface is, at any instant in time, tangential to the surface and does not possess any component normal to the surface. This second sanding surface provides the portable sander

according to the invention with a unique capability for sanding in two planes.

Where the second sanding plane is required to be normal to the first, the substantially part-conical sanding surface should be substantially part-cylindrical. On the other hand, it may in some instances be useful to provide a second sanding surface which is part-spherical (i.e. barrel-shaped) or part-inverse-spherical (i.e. hour-glass shaped), depending on the surfaces to be sanded.

To enable the sander to sand in two surfaces simultaneously and into the corner defined by the two surfaces, it is preferred that the substantially flat sanding surface meet the second sanding surface at a substantially part-circular edge.

As with existing portable sanders, it is preferred that the substantially flat sanding surface terminate at a vertex. The vertex should lie opposite the substantially part-circular edge. This will enable the sander to be used for sanding into a corner.

Since it is more likely that the sander would be required to sand into a right-angled corner than any other angle, it is preferred that the vertex makes an angle of no more than 90 degrees.

For reduced vibration, the head should be substantially symmetric about the plane containing the said predetermined axis and the vertex.

As with existing sanders, to allow the substantially flat sanding surface to get right into corners etc., unobstructed by other parts of the sanding head, the substantially flat surface should circumscribe the remainder of the head when viewed along the said predetermined axis.

For ease of use, the sanding head may be adapted to be attached to the portable oscillating sander in any one of a plurality of angular orientations about the said predetermined axis.

Where the sander includes a drive spindle to which the sanding head is adapted to be attached, this may be achieved by providing the drive spindle with a regular polygonal drive pin which forms a snap-fit in a corresponding bore in the sanding head, or *vice versa*.

The present invention will now be described with reference to the accompanying drawings, wherein:

Figure 1 is a perspective view of a sander;
Figure 2 is a perspective view of the sanding head of the sander of Figure 1;
Figure 3 is a schematic plan view from below of the sanding head of Figure 2; and
Figure 4 is a perspective view of a drive mechanism suitable for use in the sander of Figure 1.

Figure 1 illustrates a sander 10 comprising a housing 12 and an oscillating head 14. The head 14 is driven by a drive mechanism (not shown) and oscillates about an axis 16 in an angular movement. The head 14 has a lower, substantially flat sanding surface 18 which is cov-

ered with abrasive material and can sand surfaces in a plane substantially perpendicular to the axis 16.

As can be seen from Figures 2 and 3, the sanding head is of a generally tear-drop shape, terminating at one end in a vertex 20 and being provided at its other end with a part-cylindrical surface 26, which is centred on the axis 16. Two further vertices 22, 24 are provided, one on each side of the part-cylindrical surface 26. These further vertices 22, 24 can also be employed for sanding into corners using the flat sanding surface 18.

Since the part-cylindrical sanding surface 26 is centred on the axis 16 of rotation of the sanding head, it too can be used as a sanding surface and, as is illustrated in Figure 2, this surface is also covered with abrasive material. During oscillatory motion of the sanding head, there is no movement of any part of the part-cylindrical sanding surface 26 otherwise than tangential to the surface and this enables the surface 26 to be employed for sanding in a plane perpendicular to the flat sanding surface 18. Thus, the portable oscillating sander according to the invention possesses the unique capability of sanding in two planes.

Furthermore, the sander can be used to sand simultaneously in two planes and into the corner defined by the two planes, for example where a right-angled corner is required, since the two sanding surfaces 18, 26 meet one another at a part-circular edge 25.

As is evident from figure 3, the sanding head 14 is symmetrical about a plane 27 containing the axis of rotation 16 and the vertex 20. In addition, the centre of mass of the sanding head lies on the axis of rotation 16. This symmetry prevents excessive vibration of the sander. It can also be seen that the vertex 20 makes an angle of less than 90 degrees, which enables the flat sanding surface 18 to be used for sanding into a right-angled corner. Again as illustrated in Figure 3, no part of the sanding head 14 projects beyond the extremities of the flat sanding surface 18 when the head is viewed from directly below, i.e. along the axis of rotation 16.

Figure 4 illustrates a drive mechanism suitable for use in the sander 10. The mechanism includes a drive shaft 30 which is rotated about its longitudinal axis by a motor (not shown). An eccentric pin 32, on the end of the drive shaft 30, is received in rotational engagement in a bore 35 of an intermediate member 34. The intermediate member 34 has a pair of part-cylindrical side surfaces 37, which are engaged within a part-cylindrical recess 38 of a yoke 36 which is free only to rotate about an axis 16. The intermediate member 34 oscillates both up and down and from side to side as the shaft 30 rotates. To a small extent, owing to the oscillation of the yoke 36, the intermediate member also oscillates longitudinally along the eccentric pin 32. The movement of the intermediate member 34 is translated into oscillating rotation of the yoke 36 about the axis 16.

The yoke 36 is provided with a drive spindle 41 having a square drive pin 40, centred on the axis 16 and

which is a snap-fit in a corresponding bore 42 of the head 14, as illustrated in figure 2. Accordingly, the head 14 can be pulled off the drive pin 40 and reconnected in different angular orientations as suits the user.

It will of course be appreciated that the present invention has been described above purely by way of example and that modifications of detail may be made without departing from its scope which is defined by the appended claims.

Claims

1. A sanding head for a portable oscillating sander, adapted to be attached thereto so as to undergo oscillating relative rotation about a predetermined axis of the head, the sanding head including a substantially flat sanding surface substantially normal to the said axis, characterised by a second sanding surface formed by rotation of a line about an axis substantially coincident with the said predetermined axis.
2. A portable oscillating sander including a housing and a sanding head adapted to be attached thereto so as to undergo oscillating relative rotation about a predetermined axis, the sanding head including a substantially flat sanding surface substantially normal to the said axis, characterised by a second sanding surface formed by rotation of a line about an axis substantially coincident with the said predetermined axis.
3. A sanding head according to claim 1 or a sander according to claim 2, wherein the said second sanding surface is substantially part-conical.
4. A sanding head or a sander according to claim 3 wherein the substantially part-conical surface is substantially part-cylindrical.
5. A sanding head or sander according to any preceding claim wherein the substantially flat sanding surface meets the second sanding surface at a substantially part-circular edge.
6. A sanding head or sander according to claim 5 wherein the substantially flat sanding surface terminates at a vertex which opposes the substantially part-circular edge.
7. A sanding head or sander according to claim 6, wherein the head is substantially symmetric about the plane containing the said predetermined axis and the vertex.
8. A sanding head or sander according to claim 6 or claim 7, in which the vertex makes an angle of no more than 90 degrees.

9. A sanding head or sander according to any preceding claim wherein the substantially flat surface circumscribes the remainder of the head when viewed along the said predetermined axis.

10. A sanding head or sander according to any preceding claim wherein the head is adapted to be attached to the portable oscillating sander in any one of a plurality of angular orientations about the said predetermined axis.

11. A sander according to any preceding claim including a drive spindle to which the sanding head is adapted to be attached.

12. A sander according to claim 11 wherein the drive spindle includes a regular polygonal drive pin which forms a snap-fit in a corresponding bore in the sanding head, or *vice versa*.

Patentansprüche

1. Schleifkopf für ein tragbares, oszillierendes Schleifgerät, der zur Anbringung daran ausgestaltet ist, um so eine oszillierende relative Drehung um eine vorbestimmte Achse des Kopfes durchzuführen, wobei der Schleifkopf eine im wesentlichen ebene Schleiffläche hat, die im wesentlichen senkrecht zu der Achse verläuft, gekennzeichnet durch eine zweite Schleiffläche, die durch Drehung einer Linie um eine Achse gebildet ist, die im wesentlichen mit der vorbestimmten Achse zusammenfällt.

2. Tragbares, oszillierendes Schleifgerät, mit einem Gehäuse und einem Schleifkopf, der zur Anbringung daran ausgestaltet ist, um eine oszillierende relative Drehung um eine vorbestimmte Achse durchzuführen, wobei der Schleifkopf eine im wesentlichen ebene Schleiffläche hat, die im wesentlichen senkrecht zu der Achse verläuft, gekennzeichnet durch eine zweite Schleiffläche, die durch Drehung einer Linie um eine Achse gebildet ist, die im wesentlichen mit der vorbestimmten Achse zusammenfällt.

3. Schleifkopf nach Anspruch 1 oder Schleifgerät nach Anspruch 2, wobei die zweite Schleiffläche im wesentlichen teilkonisch ist.

4. Schleifkopf oder Schleifgerät nach Anspruch 3, wobei die im wesentlichen teilkonische Fläche im wesentlichen teilzylindrisch ist.

5. Schleifkopf oder Schleifgerät nach einem der vorhergehenden Ansprüche, wobei die im wesentlichen ebene Schleiffläche an einer im wesentlichen teilkreisförmigen Kante mit der zweiten Schleiffläche zusammentrifft.

6. Schleifkopf oder Schleifgerät nach Anspruch 5, wobei die im wesentlichen ebene Schleiffläche an einem Scheitelpunkt endet, der der im wesentlichen teilkreisförmigen Kante gegenüberliegt.

7. Schleifkopf oder Schleifgerät nach Anspruch 6, wobei der Kopf im wesentlichen symmetrisch zu der Ebene ist, die die vorbestimmte Achse und den Scheitelpunkt enthält.

8. Schleifkopf oder Schleifgerät nach Anspruch 6 oder nach Anspruch 7, wobei der Scheitelpunkt einen Winkel von nicht mehr als 90° bildet.

9. Schleifkopf oder Schleifgerät nach einem der vorhergehenden Ansprüche, wobei die im wesentlichen ebene Fläche in Blickrichtung entlang der vorbestimmten Achse den Rest des Kopfes umschreibt.

10. Schleifkopf oder Schleifgerät nach einem der vorhergehenden Ansprüche, wobei der Kopf dazu ausgestaltet ist, an dem tragbaren, oszillierenden Schleifgerät in einer von einer Vielzahl von Winkelorientierungen um die vorbestimmte Achse angebracht zu werden.

11. Schleifgerät nach einem der vorhergehenden Ansprüche, mit einer Antriebswelle, wobei der Schleifkopf zur Anbringung daran ausgestaltet ist.

12. Schleifgerät nach Anspruch 11, wobei die Antriebswelle einen regelmäßigen, mehrkantigen Antriebsstift enthält, der eine Schnappverbindung mit einer entsprechenden Bohrung in dem Schleifkopf bildet, oder umgekehrt.

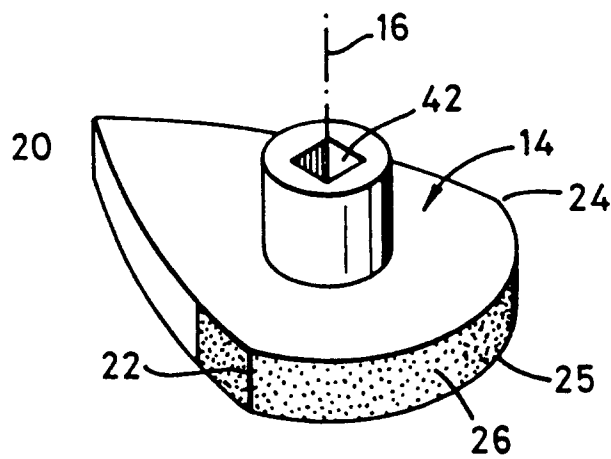
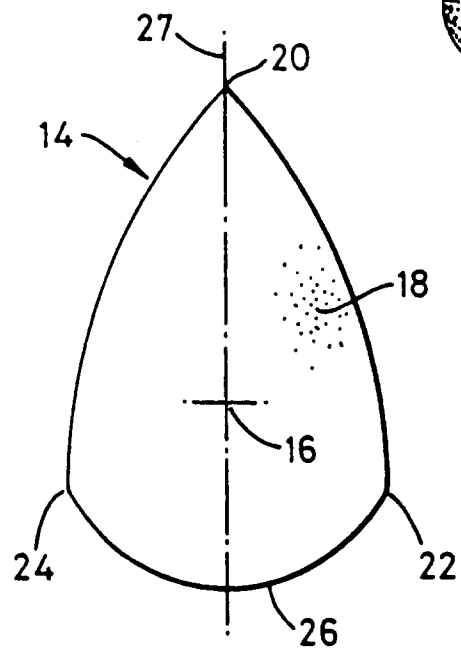
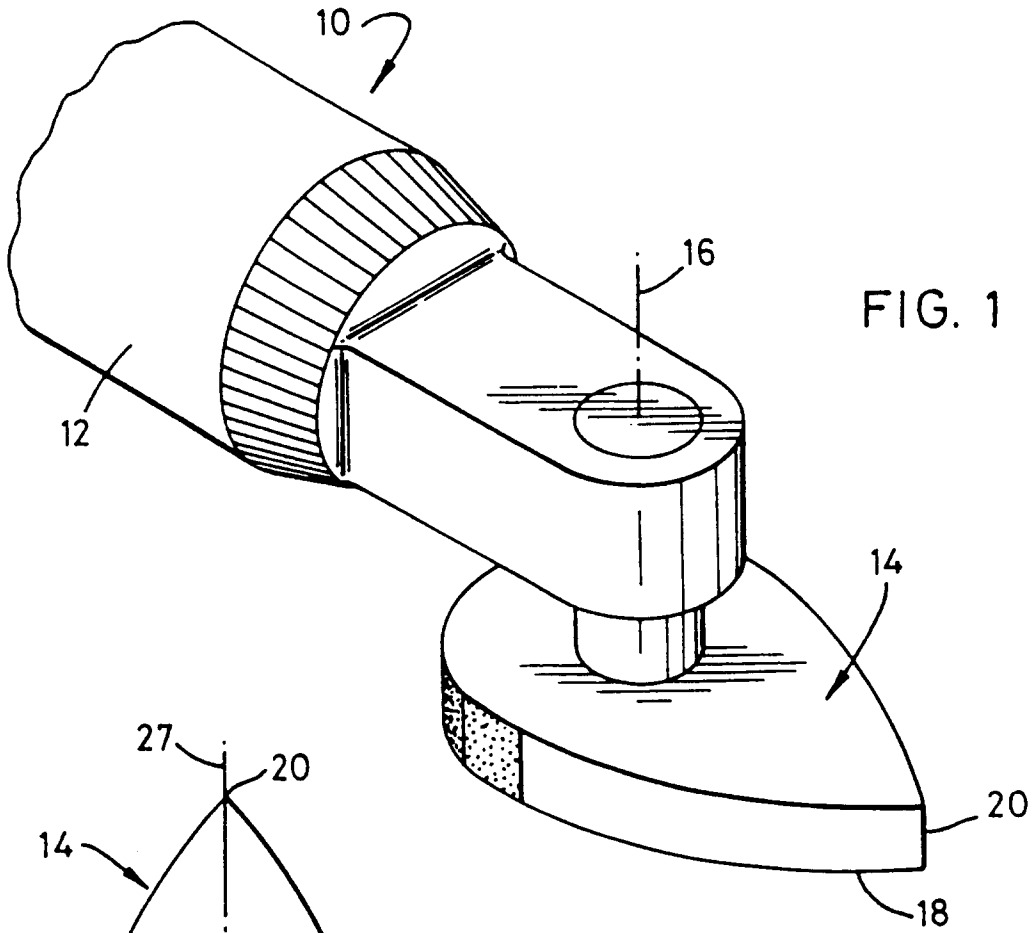
Revendications

1. Tête de ponçage pour une ponceuse vibrante portable, adaptée pour être fixée à celle-ci de façon à être soumise à une rotation relative oscillant autour d'un axe prédéterminé de la tête, la tête de ponçage comportant une surface de ponçage sensiblement plate, sensiblement normale audit axe, caractérisée par une seconde surface de ponçage formée par la rotation d'une ligne autour d'un axe coïncidant sensiblement avec ledit axe prédétermine.

2. Ponceuse vibrante portable comprenant un carter et une tête de ponçage adaptée pour être fixée à celui-ci de façon à être soumise à une rotation relative oscillant autour d'un axe prédéterminé, la tête de ponçage comprenant une surface de ponçage sensiblement plate, sensiblement normale audit axe, caractérisée par une seconde surface de ponçage formée par la rotation d'une ligne autour d'un

axe coïncidant sensiblement avec ledit axe prédéterminé.

3. Tête de ponçage conforme à la revendication 1, ou ponceuse conforme à la revendication 2, dans laquelle ladite seconde surface de ponçage a sensiblement la forme d'une partie de cône. 5
4. Tête de ponçage ou ponceuse conforme à la revendication 3, dans laquelle la surface sensiblement en partie de cône a sensiblement la forme d'une partie de cylindre. 10
5. Tête de ponçage ou ponceuse conforme à une revendication précédente quelconque, dans laquelle la surface de ponçage sensiblement plate rencontre la seconde surface de ponçage selon un bord sensiblement en partie de cercle. 15
6. Tête de ponçage ou ponceuse conforme à la revendication 5, dans laquelle la surface de ponçage sensiblement plate se termine à un sommet d'angle qui est à l'opposé du bord sensiblement en partie de cercle. 20
7. Tête de ponçage ou ponceuse conforme à la revendication 6, dans laquelle la tête est sensiblement symétrique par rapport au plan contenant ledit axe prédéterminé et le sommet d'angle. 25
8. Tête de ponçage ou ponceuse conforme à la revendication 6 ou à la revendication 7, dans laquelle le sommet d'angle forme un angle non supérieur à 90 degrés. 30
9. Tête de ponçage ou ponceuse conforme à une revendication précédente quelconque, dans laquelle la surface sensiblement plate entoure le reste de la tête lorsqu'elle est vue selon ledit axe prédéterminé. 35
10. Tête de ponçage ou ponceuse conforme à une revendication précédente quelconque, dans laquelle la tête est adaptée pour être fixée à la ponceuse vibrante portative dans l'une quelconque d'un ensemble d'orientations angulaires autour dudit axe prédéterminé. 40
11. Ponceuse conforme à une revendication précédente quelconque comprenant un tourillon d'entraînement pour lequel la tête de ponçage est adaptée pour lui être fixée. 45
12. Ponceuse conforme à la revendication 11, dans laquelle le tourillon d'entraînement comprend une broche polygonale régulière d'entraînement qui forme un ajustage d'emboîtement dans un trou correspondant de la tête de ponçage, ou vice versa. 55



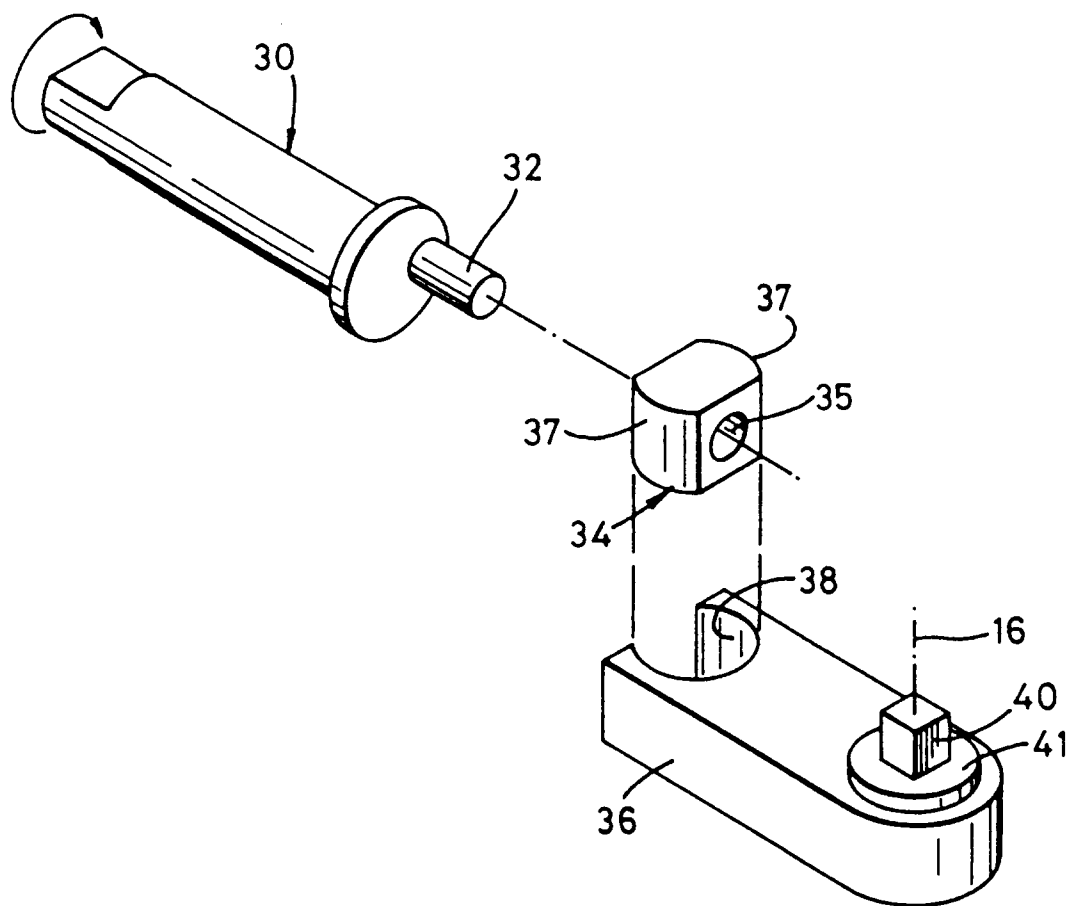


FIG. 4