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

(11) EP 0 885 690 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
25.08.2004 Bulletin 2004/35

(51) Int Cl.[7]: **B24B 23/04**

(21) Application number: **98304734.1**

(22) Date of filing: **16.06.1998**

(54) **Releasable locking mechanism**

Lösbare Sperreinrichtung

Mécanisme de verrouillage déblocable

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU NL PT SE

(30) Priority: **21.06.1997 GB 9713066**

(43) Date of publication of application:
23.12.1998 Bulletin 1998/52

(73) Proprietor: **Black & Decker Inc.**
Newark Delaware 19711 (US)

(72) Inventor: **Bone, Daniel**
Langley Moor, Durham DH7 8LW (GB)

(74) Representative: **Dlugosz, Anthony Charles et al**
Black & Decker Europe
European Group Headquarters
210 Bath Road
Slough, Berkshire SL1 3YD (GB)

(56) References cited:
US-A- 4 869 564
US-A- 5 554 066

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Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The present invention relates to a releasable locking mechanism for a power tool configured to couple a first member of the tool to a second member of the tool and comprising: manually operable detent means mounted on one of the first and second members, at least one locking member arranged for co-operation with the detent means and mounted on the other of the first and second members; the first and second members, when coupled, being held rigidly to one another and arranged to be selectively coupled to one another in more than one orientation via the detent means and the at least one locking member, which detent means and the at least one locking member are permanently attached to their respective first or second members on which they are mounted, thereby to achieve coupling of the first and second members without the need for separate tools.

[0002] Locking mechanisms such as those described hereabove have been known, for example, from powered sanders such as that described in European Patent Application number EP 0 694 365. This shows a sander having interchangeable sanding platens. The user of the sander may wish to utilise different platens for different sanding operations. For example, when removal of a large volume of dried paint from the workpiece is required, then a random orbit sanding platen will be used by the do-it-yourself (DIY) or hobbyist. Once this large volume of dried paint has been removed, it is then usual to undertake so-called detail work. This entails the fine, delicate finishing of the surface of the workpiece prior to varnishing or repainting. This can be achieved with the sanding device of EP 0 694 365 by the simple replacement of the random orbit platen by a pure orbital platen. The pure orbital platen is used for low volume removal, which is required for the detail work.

[0003] There are, however circumstances when it is desirable to change the sanding platen in order to be able to undertake a different type of sanding task, although it is not desirable to alter the nature of the platen from, for example, high removal to detail work (i.e. changing a random orbit platen to a pure orbital platen). One example of such a circumstance is where, for example, only detail work needs to be undertaken throughout the entire sanding operation.

[0004] At the start of the work, there may be a large surface area to be sanded, such as a wooden door. Later in the course of the work, the majority of the surface of the door has been sanded and only the periphery of the frame remains to be sanded. It may thus be advantageous to commence the work with a sanding platen of large area, yet to finish the work with a relatively small platen designed specifically for small areas and therefore, possibly, having a different shape to this first sanding platen. This need has also been met by the sanding device of EP 0 694 365.

[0005] There exist problems with the known type of sanding device, however. One such problem is that the user needs to use a tool or tools to be able to change one platen on the sander for another platen. This operation is inherently a fiddly task which tends to cause frustration and thus is usually attempted to be undertaken in a hurry. Even when the task of changing platens is completed, the user tends to be interested in recommencing the sanding work quickly and so there is a propensity for the tools necessary to change the platens to be lost. This, of course, leads to further frustration when the time comes to change the platens again.

[0006] Furthermore, the means by which the platens of the known device are attached to the sander include pieces which are not permanently fixed or mounted to the platens and the sander. Thus there is always the potential for these pieces to become lost and hence completely preclude the possibility of changing over platens.

[0007] US 5,554,066-discloses a sander including a releasable platen arrangement. The method by which the platen is released involves a spring-biased latch. However, the tension in the spring may vary over time and therefore does not provide a reliable means of holding a selected platen in place.

[0008] It is thus an object of the present invention to at least alleviate the aforementioned shortcomings by provision of a releasable locking mechanism for a power tool as defined in the opening paragraph and a power tool including such a releasable locking mechanism, characterised by the detent means being rotatable to couple with the at least one locking member and including a cam mechanism for urging the detent means into closer coupling with the at least one locking member upon continued rotation of the detent means.

[0009] Preferably the detent means comprises a latch movably secured within a housing and having a groove of varying width formed therein. Additionally the latch may be formed as an annulus and the groove of varying width is circumferentially formed around this annulus. This enables a high degree of manual control over the coupling.

[0010] Preferably the at least one locking member comprises a protrusion on the other of the first and second members. Also the protrusion may comprise an elongate stem bearing an end cap, the end cap having a cross-sectional area larger than the cross-sectional area of the elongate stem. This arrangement provides a convenient way of achieving the coupling between the first and second members.

[0011] It is advantageous for the cross-sectional area of the elongate stem to fit within any portion of the groove of the latch, but the cross-sectional area of the end cap to be too large to fit within a portion of the groove. Furthermore coupling of the first and second members may be achieved by rotation of the latch around the at least one locking member. The distance of the circumferential groove from the centre of the annulus may vary along the length of the groove.

[0012] The first member of the tool advantageously

comprises a base plate and the second member advantageously comprises a platen arranged to be mounted around the base plate.

[0013] The present invention will now be described, by way of example only and with reference to the following drawings, of which;

Figures 1a and b illustrate respectively above and below perspective views of a base plate of the present invention;
Figures 2 (a-c) show schematic views of the base plate of Figure 1;
Figure 3 (a) shows an above perspective view of a platen of the present invention, Figures 3 (b) and (c) show schematic views of this platen;
Figures 4 (a-d) show perspective and schematic views of the latch of the present invention;
Figure 5 shows a perspective view of the latch of Figure 4 in its mounted position in the base plate;
Figure 6 shows an above perspective view of the base plate, platen and latch all coupled together;
Figure 7 shows a perspective view of an alternative platen to that of Figure 3, this alternative platen having only once locking member, and;
Figure 8 shows a perspective view of a power tool including a releasable locking mechanism according to the present invention.

[0014] Referring firstly to Figures 1 and 2, there can be seen a first member, in this example a base plate 2 for a powered sander. Although not shown in these Figures, the sander to which the base plate is permanently mounted imparts to the base plate 2 an orbital vibrating action. The base plate 2 is mounted to the sander by way of mounting lugs 4. The base plate 2 includes two housings, an open housing 6 and detent housing 8. As can be seen more clearly from Figure 1b, the open housing 6 has an underside which defines a hollow opening 10. The purpose of this hollow opening 10 will become clear hereafter. The detent housing 8 serves to encapsulate a detent means which will also be described below.

[0015] In use of the sanding device, the orbital oscillating motion imparted to the base plate 2 is imparted via the axis A-A as seen in Figure 1a. In order for this motion to be itself imparted to a second member of the tool, in this example a sanding platen 12 as shown by referring now also to Figures 3, there needs to be some method of coupling the base plate 2 to the sanding platen 12.

[0016] It will be seen from Figures 3a to c that the sanding platen 12 has a generally smoothing-iron shaped outer profile 14. This is of well known shape and is used generally within the art of sanding. This will not be described any further herein. The sanding platen 12 also has an inner peripheral shape defined by a recess 16. It will be seen by comparing the recess of Figures 3 with the outer profile of the base plate 2 of Figures 1 and 2, that the recess 16 is designed to mate with the base plate 2. Indeed the base plate 2 fits snugly within the recess 16.

[0017] Considering in more detail the sanding platen 12 of Figures 3a to c, it can be seen that within the recess 16 there is arranged at least one locking member, in this example two protrusions 18. It will be further appreciated that when the base plate 2 is snugly fitted within the recess 16 then one of the protrusions 18 will sit within the detent housing 8 and the other protrusion 18 will sit within the hollow opening 10.

[0018] It will be understood from the drawings of Figure 3 that the underside 20 of the platen 12 will carry a sheet of sandpaper in conventional manner. Those skilled in the art will understand that such sandpaper often has a series of holes punched therein in order to aid dust extraction and therefore the platen 12 has corresponding holes 22 formed therein in order to be aligned with corresponding holes in the sanding paper (not shown).

[0019] It will be appreciated that the sanding platen 12 of Figures 3 a-c may be coupled to the base plate 2 in one of two orientations. That is to say either one of the protrusions 18 may, when the base plate 2 is snugly fitted within the recess 16, fit within either the detent housing 8 or the hollow opening 10.

[0020] Referring now to Figures 4 a-d, it will be explained how the detent means of the present invention operates. In Figure 4 there is illustrated a detent means shown generally as 24 which, in this example comprises a latch formed as an annulus 26 having a groove 28 of varying width formed therein. The varying width of the groove 28 may best be seen from Figure 4d. In a preferred embodiment, the width of the groove 28 varies linearly so as to either reduce or increase along the circumference of the annulus 26.

[0021] By referring now also to Figures 5 and 6 it can be seen how the detent means 24 is permanently housed within the detent housing 8 so as to enable utility of the present invention. It can be seen more clearly from Figure 5 that the detent housing 8 has a collar 30 formed therein. Within this collar 30 the neck 32 of the detent means 24 is arranged to sit. It will be seen that the detent means 24 is rotatable about the neck 32 thereby to also rotate the annulus 26 and therefore the groove 28.

[0022] Coupling of the base plate 2 to the platen 12 is achieved as follows. Most clearly shown from Figure 3c it will be seen that each protrusion 18 comprises an elongate stem 34 terminating in an end cap 36. It will also be appreciated that the cross sectional area of the elongate stem 34 is smaller than the cross sectional area of the end cap 36. By rotating the detent means 24 to a position where the groove 28 is positioned above the or each protrusion 18, coupling between the base plate 2 and the platen 12 may be effected. It will be understood that the groove 28 of varying width along the circumference of the annulus 26 must have the following characteristics. Firstly one end of the groove 28 must be of

width larger than the cross sectional area of the elongate stem 34 and the other end of the circumferential groove 28 must be of width smaller than the cross sectional area either of the stem 34 or of the end cap 36. In this manner therefore with correct alignment of the groove 28 over the protrusion 18, the base plate 2 may be positioned into a snug fitting within the recess 16 of the platen 12. The user may then rotate the detent means 24 so as to cause the groove 28 to catch in a position around the elongate stem 34 but below the end cap 36 and thereby on continued rotation of the detent means 24 cause either the stem 34 or the end cap 36 to be held within the groove 28.

[0023] It will be appreciated therefore that release of the platen 12 from the base plate 2 cannot be achieved until rotation of the detent means 24 back to its original position occurs whereby the width of the groove 28 is not sufficiently narrow to prevent passage there through of the end cap 36 of the protrusion 18.

[0024] It will be appreciated that a more secure coupling of the base plate 2 to the platen 12 may be achieved if, for example, the radial distance of the groove 28 from the centre of the annulus 26 varies along the length of the groove 28. In this way a cam mechanism may be achieved by which the end cap 36 may be pulled up toward the detent housing 8 as the latch 24 is rotated so as to cause a reduction of this distance.

[0025] Those skilled in the art will appreciate that the manually operable detent 26 disclosed here above enables operation to be achieved solely by the hands of the user without the need for a separate tools.

[0026] It will also be appreciated that whilst the present invention has been described by reference to a powered sander, the term power tool is sufficiently broad to encompass any type of power tool for which the present invention would find use.

[0027] Although in the above examples two protrusions 18 have been shown, the present invention would work with a different number for example 1, 3, 4, 5, 6, etc. Two have been shown only by way of example and this number is not meant to be limiting. It would be understood that if a different number of protrusions are used then different geometries particularly the outer peripheral shape of the base plate 12 and recess 16 will be needed but this is not beyond the capability of one skilled in the art. As an example of a different number of protrusions 18, Figure 7, shows an alternative base plate 2 to that of Figure 2. In Figure 7, like components are similarly numbered as compared to Figure 2. It will be noted, however, that only one protrusion 18 is present in this example.

[0028] Figure 8 shows a perspective view of a power tool, in this case a powered sander 40, including a releasable locking mechanism according to the present invention.

Claims

1. A releasable locking mechanism for a power tool configured to couple a first member (2) of the tool to a second member (12) of the tool and comprising: manually operable detent means (24) mounted on one of the first (2) and second (12) members, at least one locking member (18) arranged for co-operation with the detent means (24) and mounted on the other of the first (2) and second (12) members; the first (2) and second (12) members, when coupled, being held rigidly to one another and arranged to be selectively coupled to one another in more than one orientation via the detent means (24) and the at least one locking member (18), which detent means (24) and the at least one locking member (18) are permanently attached to their respective first (2) or second (12) members on which they are mounted, thereby to achieve coupling of the first (2) and second (12) members without the need for separate tools; the mechanism **characterised by** the detent means (24) being rotatable to couple with the at least one locking member (18) and including a cam mechanism (26, 28) for urging the detent means (24) into closer coupling with the at least one locking member (18) upon continued rotation of the detent means (24).

2. A releasable locking mechanism as claimed in claim 1 wherein the detent means (24) comprises a latch (24) movably secured within a housing (8) and having a groove (28) of varying width formed therein.

3. A releasable locking mechanism as claimed in claim 2 wherein the latch is formed as an annulus (126) and the groove of varying width is circumferentially formed around this annulus (26).

4. A releasable locking mechanism as claimed in any one of the preceding claims wherein the at least one locking member (18) comprises a protrusion on the other of the first and second members.

5. A releasable locking member as claimed in claim 4 wherein the protrusion comprises an elongate stem (34) bearing an end cap (36), the end cap having a cross-sectional area larger than the cross-sectional area of the elongate stem.

6. A releasable detent means as claimed in claim 5 wherein the cross-sectional area of the elongate stem (34) fits within any portion of the groove (28) of the latch, but the cross-sectional area of the end cap (36) is too large to fit within a portion of the groove.

7. A releasable locking mechanism as claimed in any one of the preceding claims and wherein mounted

on the other of the first and second members are a plurality of locking members.

8. A releasable locking mechanism according to claim 7 wherein the first and second members may be coupled to one another in either of two differing orientations, these being 180° apart.

9. A releasable locking mechanism according to claim 8 wherein the distance of the circumferential groove from the centre of the annulus varies along the length of the groove.

10. A releasable locking mechanism according to any one of the preceding claims wherein the first member of the tool comprises a base plate and the second member comprises a platen arranged to be mounted around the base plate.

11. A power tool including a releasable locking mechanism according to any one of claims 1 to 10.

12. A power tool according to claim 11 wherein the power tool comprises a sander.

Patentansprüche

1. Lösbarer Verriegelungsmechanismus für ein kraftgetriebenes Werkzeug, der konfiguriert ist, um ein erstes Bauteil (2) des Werkzeugs mit einem zweiten Bauteil (12) des Werkzeugs zu koppeln, und aufweist: eine manuell betätigbare Verriegelungseinrichtung (24), die an einem von dem ersten (2) und zweiten (12) Bauteil montiert ist, zumindest einem Verriegelungsbauteil (18), das zum Zusammenwirken mit der Verriegelungseinrichtung (24) ausgestaltet und an dem anderen von dem ersten (2) und zweiten (12) Bauteil montiert ist, wobei das erste (2) und das zweite (12) Bauteil, wenn miteinander gekoppelt, fest aneinander gehalten werden und dazu ausgestaltet sind, um mittels der Verriegelungseinrichtung (24) und des zumindest einen Verriegelungsbauteil (18) wahlweise in mehr als einer Ausrichtung miteinander gekoppelt zu werden, wobei die verriegelungseinrichtung (24) und das zumindest eine Verriegelungsbauteil (18) permanent an dem ersten (2) bzw. zweiten (12) Bauteil angebracht sind, an denen sie montiert sind, um dadurch das Koppeln des ersten (2) und zweiten (12) Bauteils ohne das Erfordernis separater Werkzeuge zu erreichen, wobei der Mechanismus **dadurch gekennzeichnet ist, dass** die Verriegelungseinrichtung (24) drehbar ist, um mit dem zumindest einen Verrieaelungsbauteil (18) gekoppelt zu werden, und einen Nockenmechanismus (26, 28) aufweist, um die Verriegelungseinrichtung (24) bei fortwährender Drehung' der Verriegelungseinrichtung (24) in engerer Kopplung mit dem zumindest einen Verriegelungsbauteil (18) zu koppeln.

2. Lösbarer Verriegelungsmechanismus nach Anspruch 1, bei dem die Verriegelungseinrichtung (24) einen. Riegel (24) aufweist, der bewegbar in einem Gehäuse (8) befestigt ist und eine Nut (28) mit variierender Breite aufweist, die darin ausgebildet ist.

3. Lösbarer Verriegelungsmechanismus nach Anspruch 2, bei dem der Riegel als ein Ring (126) ausgebildet ist und die Nut mit variierender Breite in Umfangsrichtung um diesen Ring (26) herum ausgebildet ist.

4. Lösbarer Verriegelungsmechanismus nach einem der vorhergehenden Ansprüche, bei dem das zumindest eine Verriegelungsbauteil (18) einen Vorsprung an dem anderen von dem ersten und zweiten Bauteil aufweist.

5. Lösbares Verriegelungsbauteil nach Anspruch 4, bei dem der Vorsprung einen länglichen Schaft (34) aufweist, der eine Endkappe (36) trägt, wobei die Endkappe einen Querschnittsbereich hat, das größer ist als der Querschnittsbereich von dem länglichen Schaft.

6. Lösbare Verriegelungseinrichtung nach Anspruch 5, bei der der Querschnittsbereich von dem länglichen Schaft (34) in einen Bereich der Nut (28) des Riegels passt, aber der Querschnittsbereich der Endkappe (36) zu groß ist, um in einen Bereich der Nut zu passen.

7. Lösbarer Verriegelungsmechanismus nach einem der vorhergehenden Ansprüche, bei dem eine Vielzahl von Verriegelungsbauteilen an dem anderen von dem ersten und dem zweiten Bauteil montiert ist.

8. Lösbarer Verriegelungsmechanismus nach Anspruch 7, bei dem das erste und das zweite Bauteil in einer von zwei unterschiedlichen Ausrichtungen miteinander gekoppelt sind, wobei diese um 180° voneinander versetzt sind.

9. Lösbarer Verriegelungsmechanismus nach Anspruch 8, bei dem der Abstand der Umfangsnut von der Mitte des Rings entlang der Länge der Nut variiert.

10. Lösbarer Verriegelungsmechanismus nach einem der vorhergehenden Ansprüche, bei dem das erste Bauteil des Werkzeugs eine Basisplatte und das zweite Bauteil eine Auflageplatte umfasst, die dazu ausgestaltet ist, um um die Basisplatte herum montiert zu sein.

11. Kraftgetriebenes Werkzeug mit einem lösbaren Verriegelungsmechanismus nach einem der Ansprüche 1 bis 10.

12. Kraftgetriebenes Werkzeug nach Anspruch 11, bei dem das kraftgetriebene Werkzeug ein Schleifgerät umfasst.

Revendications

1. Mécanisme de verrouillage déblocable pour un outil électrique configuré pour raccorder un premier élément (2) de l'outil à un second élément (12) de l'outil et comprenant : des moyens de dégagement pouvant être actionnés manuellement (24) montés sur un des premier (2) et second éléments (12), au moins un élément de verrouillage (18) disposé pour coopérer avec les moyens de dégagement (24) et monté sur l'autre des premier (2) et second (12) éléments ; les premier (2) et second (12) éléments, lorsqu'ils sont raccordés, étant maintenus de manière rigide l'un à l'autre et disposés pour être sélectivement raccordés l'un à l'autre dans plus d'une orientation par l'intermédiaire des moyens de dégagement (24) et du au moins un élément de verrouillage (18), lesquels moyens de dégagement (24) et le au moins un élément de verrouillage (18) sont fixés de manière permanente sur leurs premier (2) et second (12) éléments respectifs sur lesquels ils sont montés, pour ainsi réaliser le raccordement des premier (2) et second (12) éléments sans nécessité de recourir à des outils distincts ; le mécanisme **caractérisé par** les moyens de dégagement (24) qui peuvent être pivotés pour s'accoupler avec le au moins un élément de verrouillage (18) et comprenant un mécanisme à came (26, 28) pour pousser les moyens de dégagement (24) dans un raccordement plus étroit avec le au moins un élément de verrouillage (18) lors de la rotation continue des moyens de dégagement (24).

2. Mécanisme de verrouillage déblocable selon la revendication 1, dans lequel les moyens de dégagement (24) comprennent un loquet (24) fixé de manière mobile dans un logement (8) et comportant une gorge (28) à largeur variable formée à l'intérieur dudit logement.

3. Mécanisme de verrouillage déblocable selon la revendication 2, dans lequel le loquet a la forme d'un anneau (126) et la gorge à largeur variable est formée de manière circonférentielle autour de cet anneau (126).

4. Mécanisme de verrouillage déblocable selon l'une quelconque des revendications précédentes, dans lequel le au moins un élément de verrouillage (18) comprend une protubérance sur l'autre des premier et second éléments.

5. Mécanisme de verrouillage déblocable selon la revendication 4, dans lequel la protubérance comprend une tige allongée (34) supportant un embout (36), l'embout comportant une zone transversale plus grande que la zone transversale de la tige allongée.

6. , Moyen de verrouillage selon la revendication 5, dans lequel la zone transversale de la tige allongée (34) se loge dans n'importe quelle partie de la gorge (28) du loquet, mais la zone transversale de l'embout (36) est trop grande pour se loger à l'intérieur d'une partie de la gorge.

7. Mécanisme de verrouillage déblocable selon l'une quelconque des revendications précédentes et dans lequel une pluralité d'éléments de verrouillage sont montés sur l'autre des premier et second éléments.

8. Mécanisme de verrouillage déblocable selon la revendication 7, dans lequel les premier et second éléments peuvent être raccordés l'un à l'autre dans l'une ou l'autre des deux orientations, celles-ci étant distantes de 180°.

9. Mécanisme de verrouillage déblocable selon la revendication 8, dans lequel la distance de la gorge circonférentielle depuis le centre de la couronne varie le long de la longueur de la gorge.

10. Mécanisme de verrouillage déblocable selon l'une quelconque des revendications précédentes, dans lequel le premier élément de l'outil comprend une plaque de base et le second élément comprend une plaque disposée pour être montée autour de la plaque de base.

11. Outil électrique comprenant un mécanisme de verrouillage déblocable selon l'une quelconque des revendications 1 à 10.

12. Outil électrique selon la revendication 11, dans lequel l'outil électrique comprend une ponceuse.

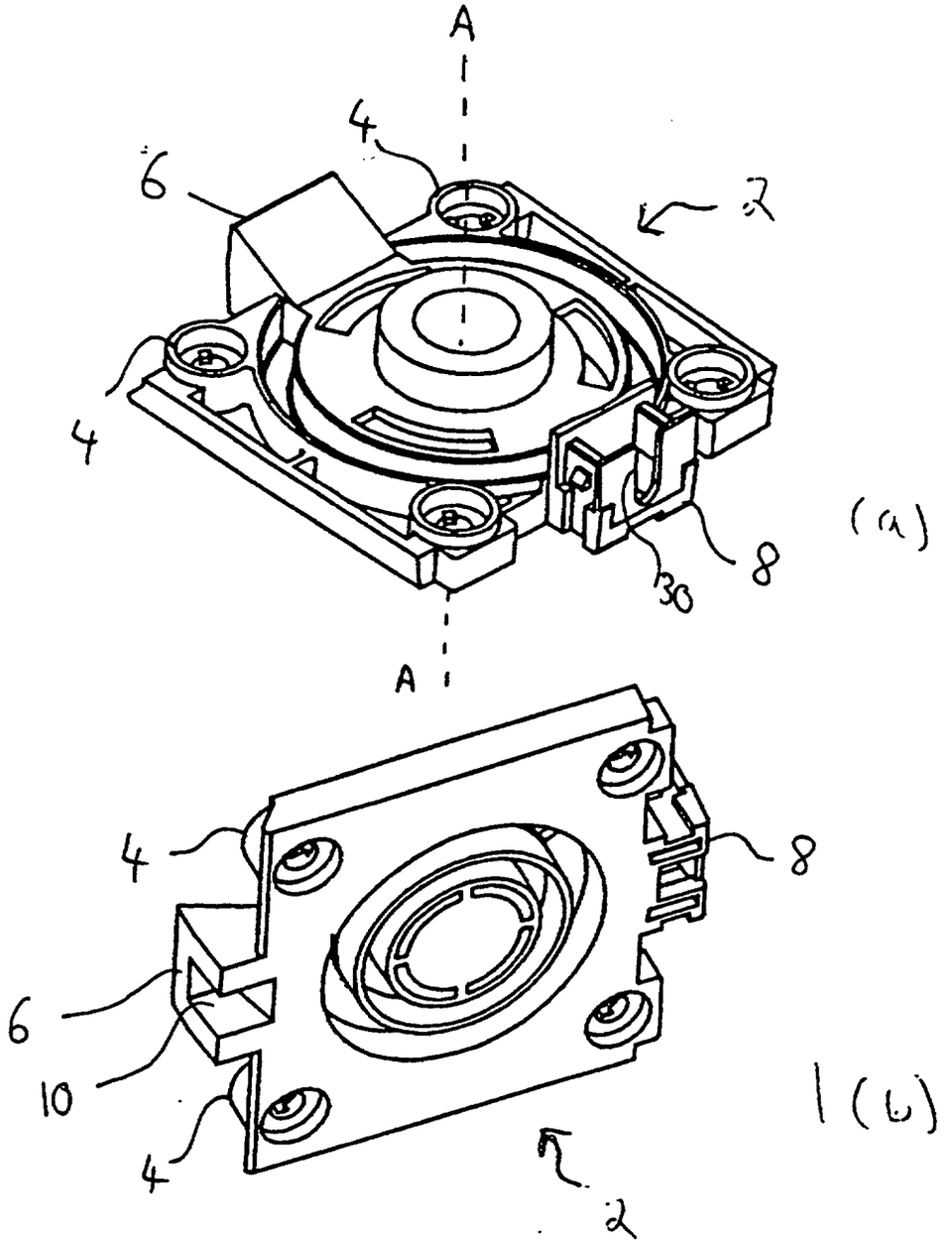
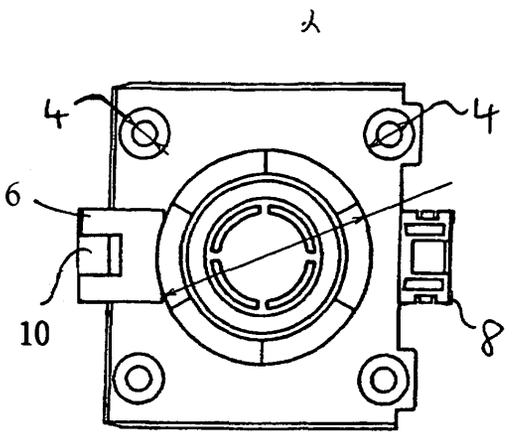
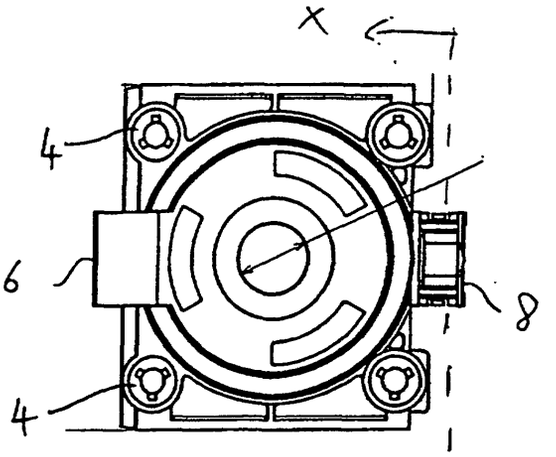


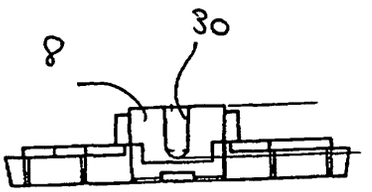
FIG 5 1



2(a)

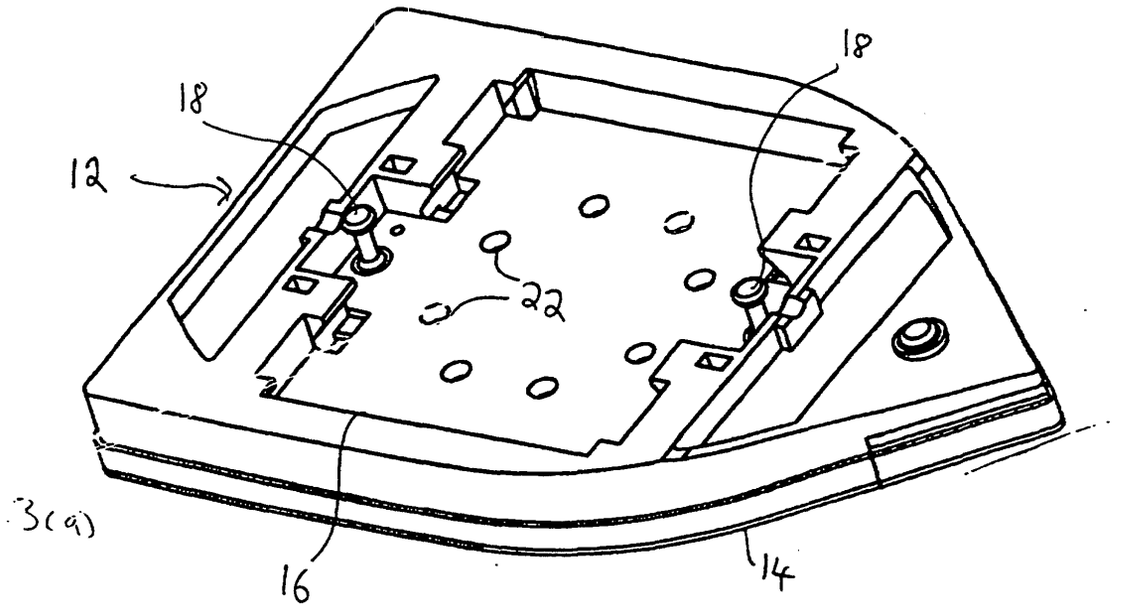


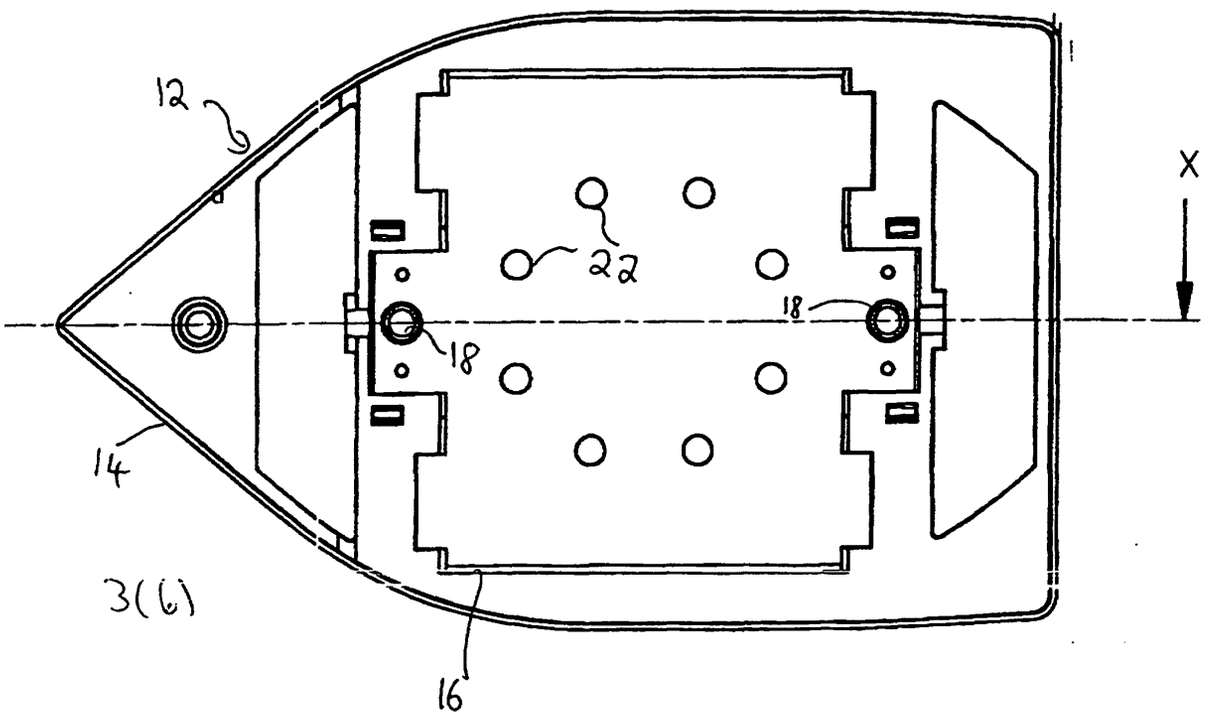
2(b)

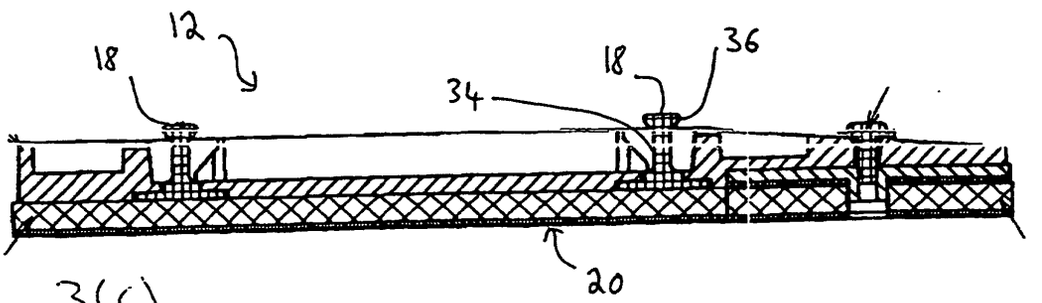


2(c)

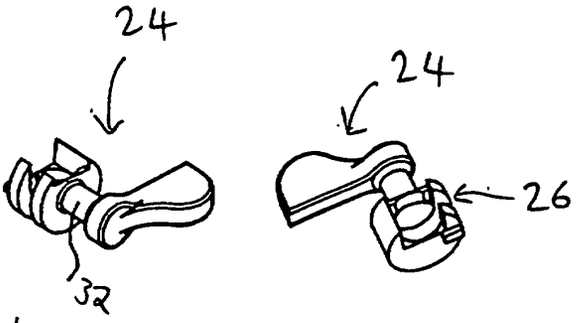
FIG 2



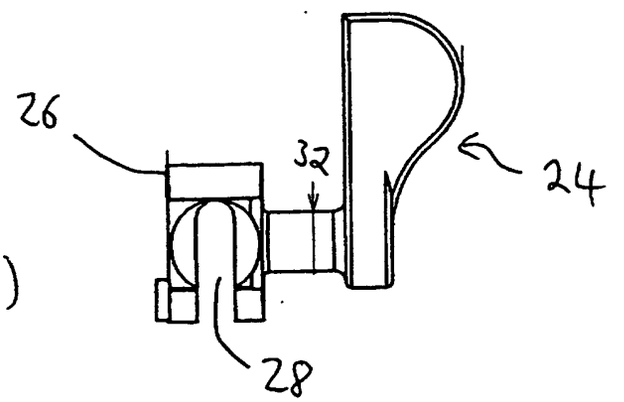




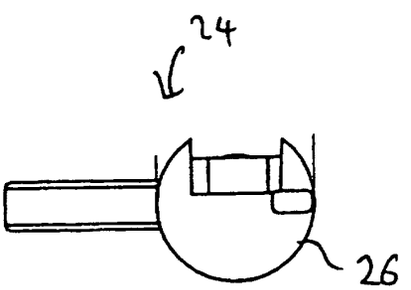
FIGS 3



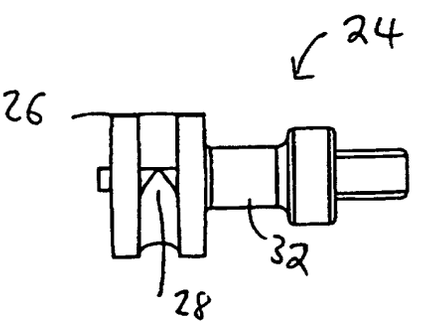
4(a)



4(b)



4(c)



4(d)

FIGS 4

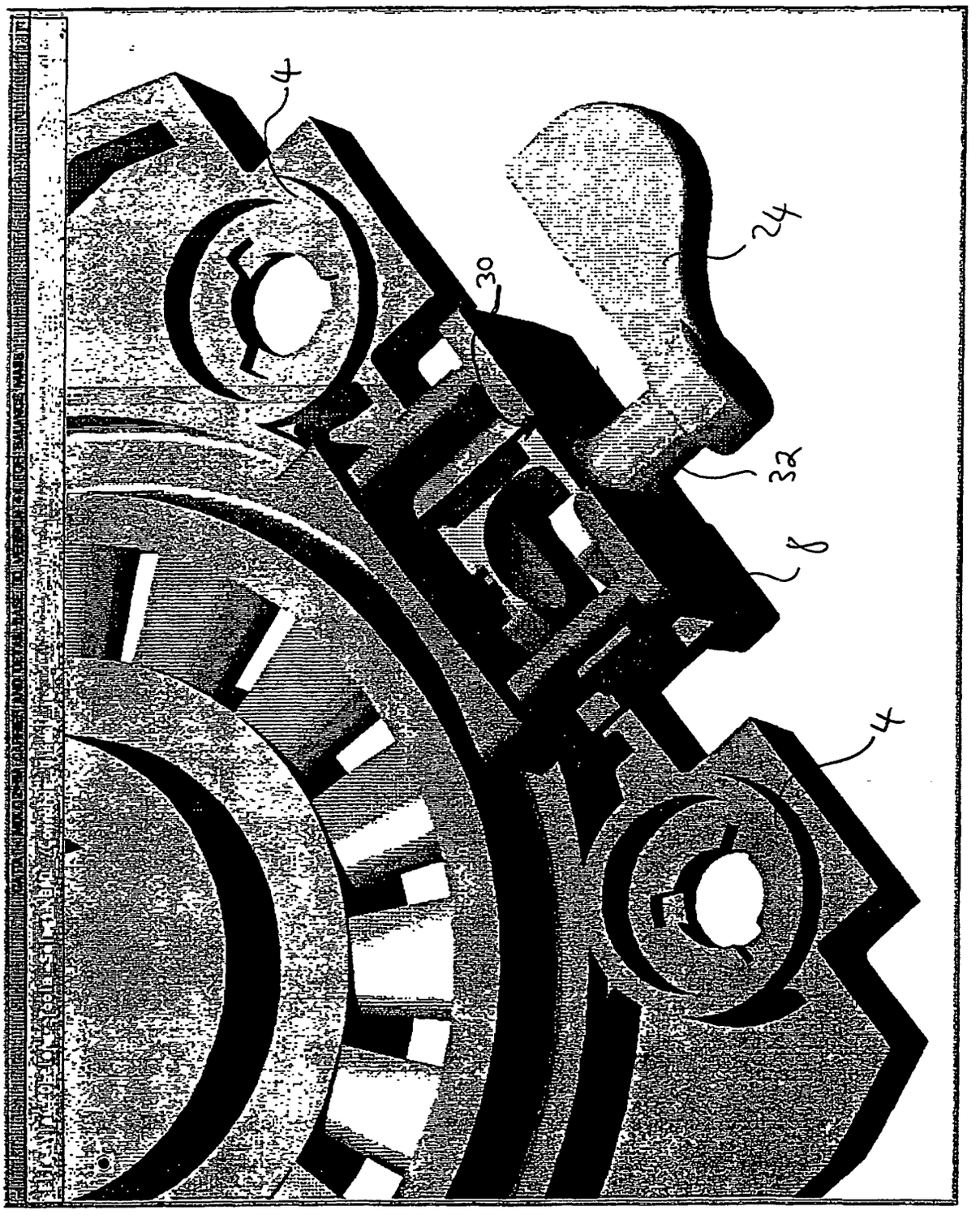


FIG 5

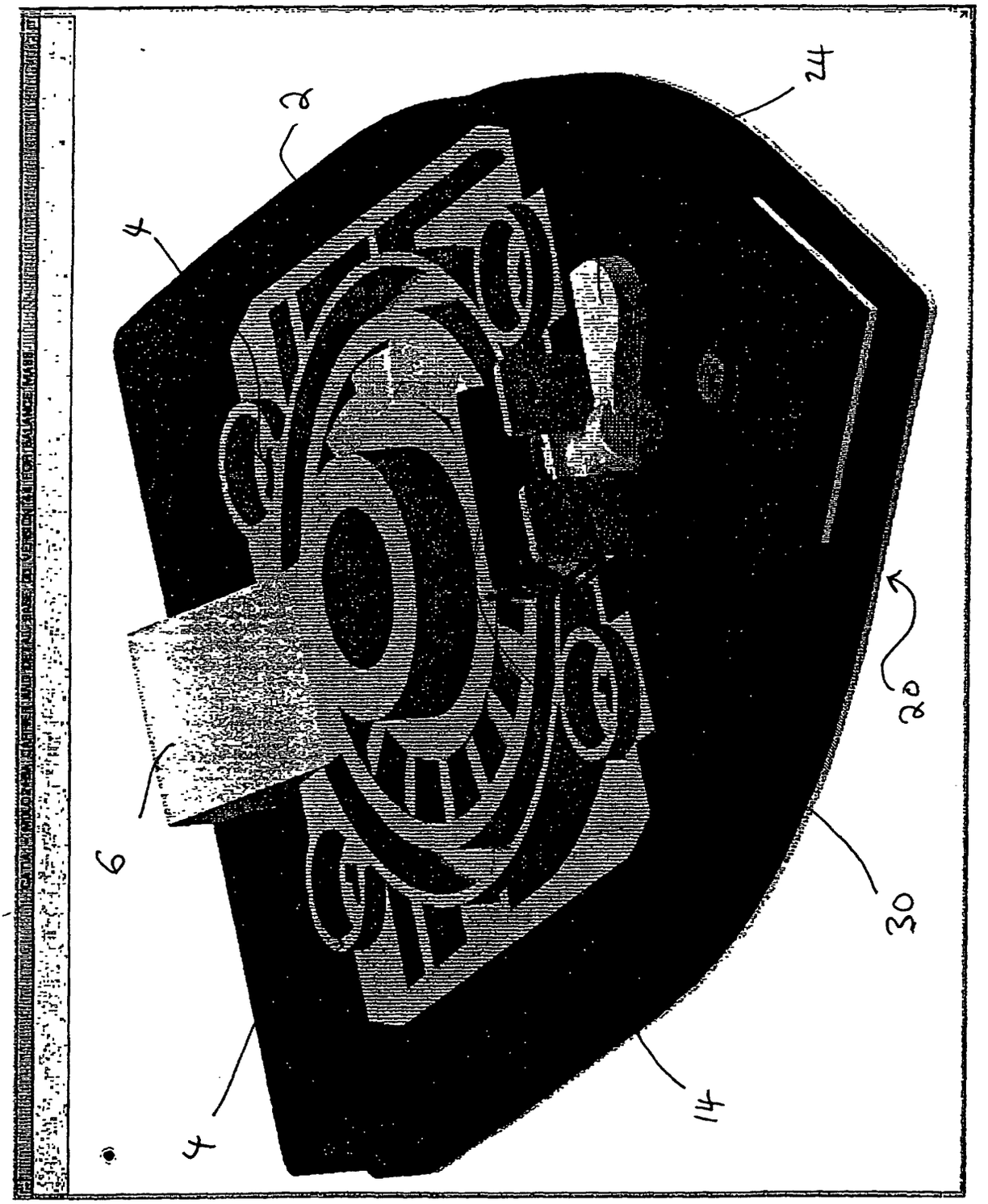


FIG 6

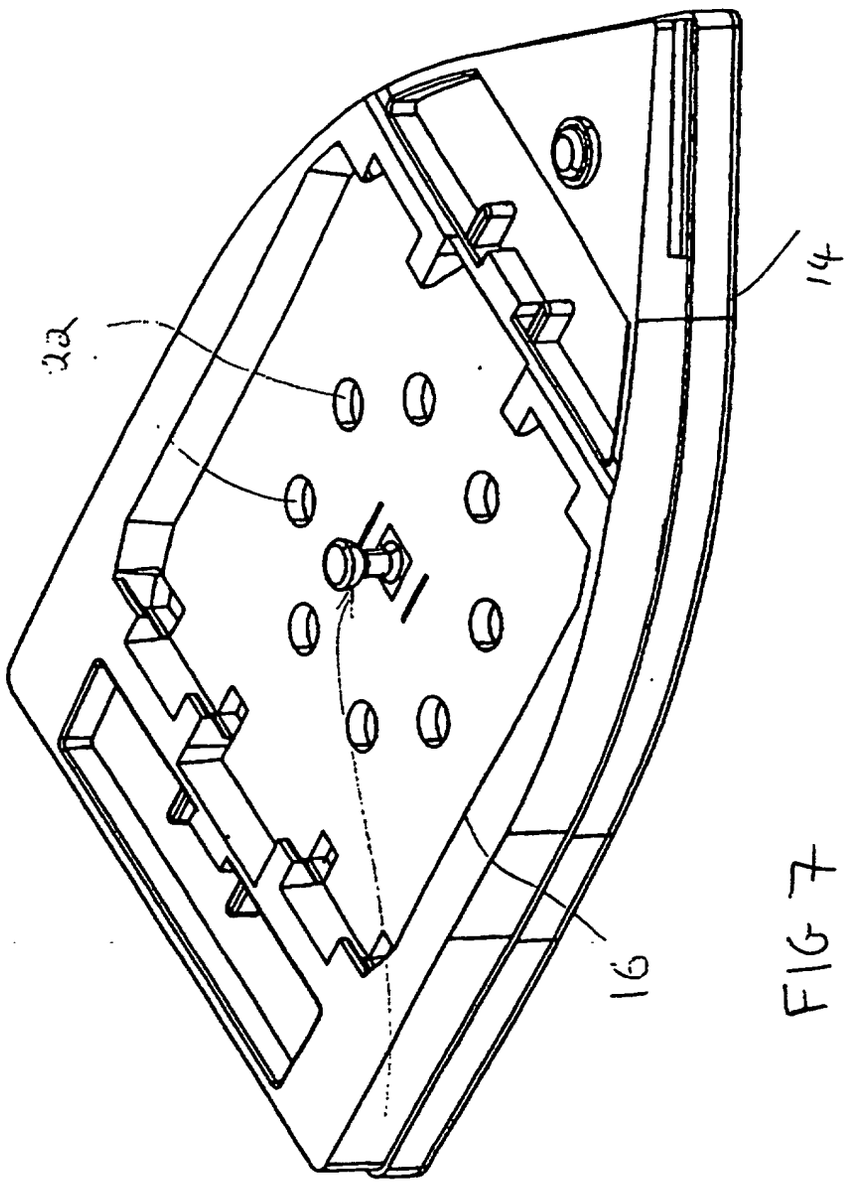


FIG 7

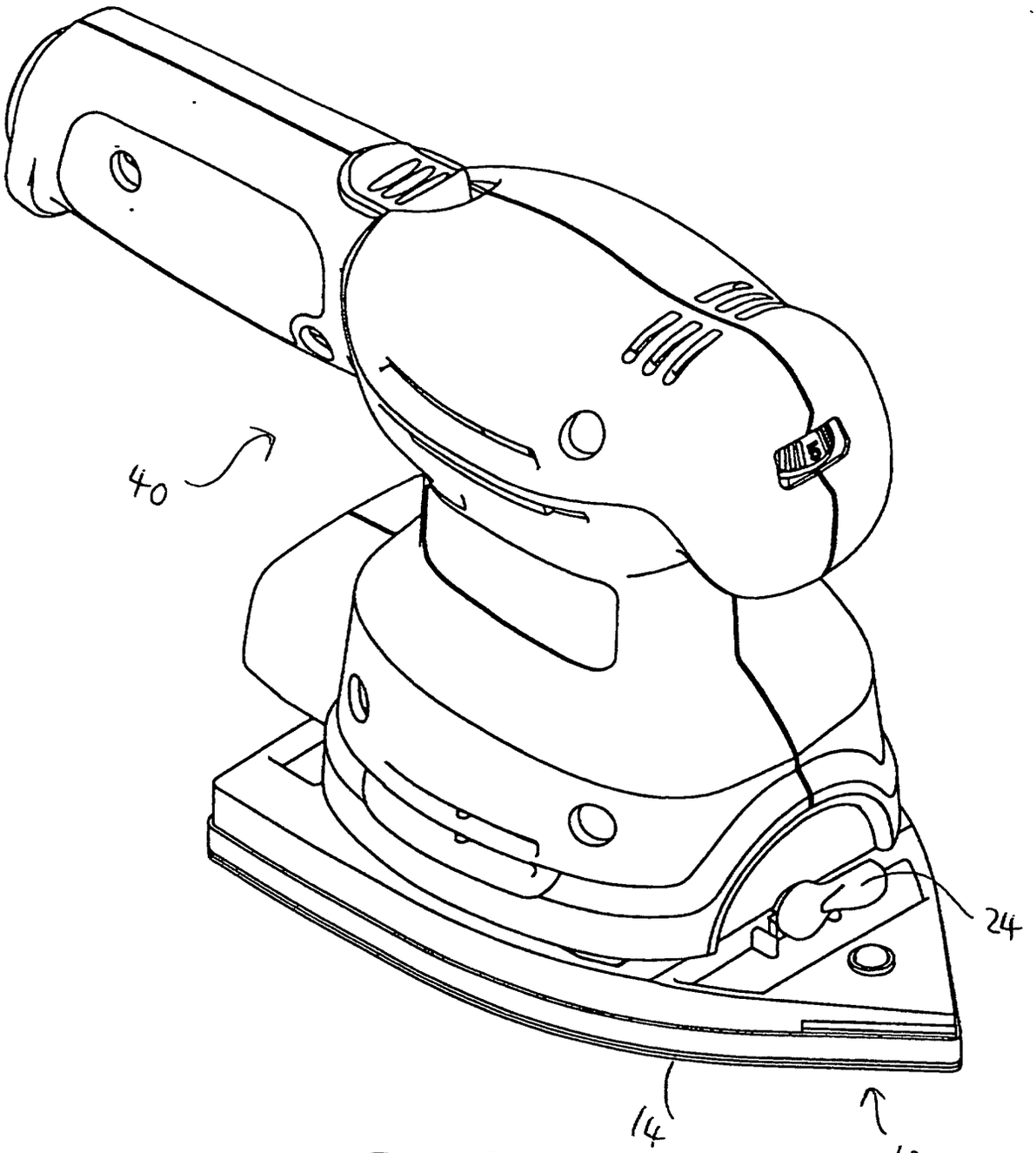


FIG 8