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This invention relates to dry shavers of the form comprising a pair of parallel elongate shaver heads mounted on a common shaver frame for movement relative thereto, in use of the shaver, in order to make it easier for the user to maintain both heads in contact with the skin surface being shaved.

A dry shaver of this general form was proposed in US Patent 2526153, Figures 1 to 7 of which illustrate a shaver having a pair of cylindrical heads supported at opposite ends of a simple "see-saw" support linkage. This arrangement imposes undesirable limitations in design and function. For example, it requires the provision of a mounting arrangement beyond the ends of the heads, thus consuming extra space in a critical area of the shaver where space is at a premium and it entails positioning the pivotal axis of the heads in the same plane as their longitudinal axes, which is functionally far from ideal.

In accordance with a feature of the present invention, the heads of a dry shaver of the form first described are carried at the respective upper ends of a pair of generally vertical, parallel side members mounted on the frame for vertical movement relative to each other and relative to the frame, whilst constrained to remain parallel with each other, the side members being coupled together below their upper ends by at least one transverse link whose opposite ends are pivotally connected to the respective side members and which is pinned intermediate its ends to the frame for pivotal movement about an axis parallel with those of the shaver heads.

For convenience of description, it has been assumed that the side members are vertical, with the heads uppermost, relative to the rest of the dry shaver.

Preferably, the pivotal mounting of the (or each) link to the frame is set half-way between the side members and above its connection to the respective side members.

With this construction the mounting arrangement is situated below the heads and is easily accommodated within the body of the shaver, so that the need to establish a physical pivot mounting in the vicinity of the heads is obviated.

Because the side members are coupled to the link below its pivotal mounting, the arrangement is very sensitive to horizontal side forces applied to either head, as well as to generally vertical forces.

Furthermore, it is possible to arrange for a notional plane tangent to the skin engaging surfaces of the two heads to pass through or close to an imaginary fixed pivot point at which the plane intersects a vertical plane of symmetry mid-way between the heads. As will be explained more fully below, this renders the heads highly sensitive to changes in facial contours and enables them to respond rapidly and easily to such changes in maintaining substantially equal pressures on both heads.

One form of dry shaver and a modification thereof, both in accordance with the invention, will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic side view of the heads and mounting linkage only;

Figure 2 is an exploded perspective view of part of the dry shaver;

Figure 3 is an exploded view showing the drive mechanism of the dry shaver;

Figures 4 and 5 are transverse and longitudinal cross-sections of the upper region of the shaver;

Figure 6 is a side view showing a modified form of mounting linkage; and

Figure 7 is an exploded perspective view of a dry shaver incorporating the mounting linkage of Figure 6.

Figure 1 illustrates a pair of parallel elongate shaving heads A and B, shown here as cylindrical in cross-section purely in the interests of simplicity. The heads are mounted at the upper ends of vertical side members 1A and 1B of the four bar mounting linkage which is completed by upper and lower transverse link members 2 and 3, formed as identical bell-crank levers pinned at their centres to fixed points 4 and 6 on the shaver frame (not shown). The ends of the upper member 2 are pinned at 7, 8 to the respective side members 1A, 1B, intermediate their ends and the ends of the lower member 3 are pinned at 9, 11 to the lower ends of the respective side members.

In a medial neutral position of the parts a notional tangent N to the upper surfaces of the heads will be horizontal, corresponding to the positions of the heads A, B and of the transverse members 2, 3 shown shaded in the drawing. The application of any force applied to one head which is not exactly counterbalanced by a force applied to the other head will cause the linkage to be displaced angularly about the fixed points 4 and 6. As a result the heads will shadow the pivotal movement of the transverse members 2, 3 and the notional plane N will pivot about an imaginary and fixed pivot point P where the plane intersects the vertical plane of symmetry extending through the fixed pivot points 4 and 6, i.e. mid-way between the heads.

Because the connections 7, 8 and 9, 11 are set at a substantial distance below the fixed pivot points 4 and 6, the linkage is highly sensitive to and readily displaceable by any out-of-balance forces acting on the heads over a wide angular range, from vertically downwards to horizontal.

Furthermore, as the shaver is moved across the skin in use, substantial drag forces are experienced by the heads, essentially acting in the tangent plane, generally perpendicular to the lengths of the heads, and since the imaginary or effective axis P is in this plane at all times, the drag forces do not exert an out of balance couple tending to tilt the heads. This is in contrast to the arrangement shown in US 2526153, where the drag forces act at a substantial distance above the pivotal axis and therefore tend to tilt the leading head upwardly, forcing the trailing head down, all of which largely defeats the object of providing for relative movement of the heads, namely to maintain substantially equal pressures on the two heads.

Figure 2 illustrates the mounting linkage at one end of the shaver frame, whose adjacent end wall 12

carries two fixed pivot pins 4, 6 to mount the members 2, 3, whose respective pins 8, 11 carry the side member 1B. The opposite side member 1A is omitted from the Figure but is received on pins 7, 9. The upper end of side member 1B forms an end wall fast with respective frame members 13, 14 to which an outer, flexible foil 16 of arched form is attached. This mounting linkage is, of course, duplicated at the opposite end of the shaver frame.

The inner cutters of the heads are both of identical cylindrical form as indicated at 17 in Figure 3, which shows the essential features of the drive mechanism for reciprocating the inner cutter.

Each inner cutter 17 is carried by a double cantilever spring 18 secured at its centre to a yoke 19 having depending legs 21 pivotally connected to opposite end walls of a common drive frame 22 on pins 23 projecting outwardly from both ends of the frame and defining first axes. Internally, the frame is provided with aligned central pins 24 defining a second axis, whose geometrical and spatial relationship to the first axes (pins 23) is the same as that of the pins 4 and 6 to the pins 7, 8 and 9, 11, respectively.

A drive block 26 has a longitudinal arcuate recess 27 to receive the pins 24 and is itself coupled to a horizontally reciprocating drive arm 28 by a pin 29.

Thus, the drive frame 22 is pivotable about the axis of central pins 24 and the yokes 19 are pivotable about the axes of the respective pairs of pins 23, enabling the inner cutters 17 to follow exactly the movements of the outer foils relative to the shaver frame. In the assembled shaver the inner cutters are pressed firmly into engagement with their respective outer foils by the springs 18, the upper, operative portions of the foils thus adopting an arcuate form.

Principal features of the assembly are illustrated in Figures 4 and 5 which are transverse and longitudinal cross-sections of the upper region of the dry shaver. The same reference numerals as before are used in these Figures which are not believed to require further explanation.

In one possible modification (not shown) a single transverse link is provided, say intermediate the ends of the side members, the lower ends of which are provided with pins guided in arcuate slots formed in a frame member so as to constrain the side members to maintain their parallel relationship.

In the modified dry shaver shown in Figs. 6 and 7, the general function and operation is as described above in relation to Figs. 1 to 5, but the constructional details of the mounting arrangement at each end of the heads are modified in that the arms 1A, 1B, link members 2, 3 and pivot pins 4, 6 are all provided in a unitary plastics moulding, the links being integrally connected to the arms by flexible hinges 7', 8', 9' and 11' which perform the functions of the pins 7, 8, 9 and 11 of the first embodiment.

The mouldings are pivotally secured by the pins 4, 6 to apertured mounting plates 12A in turn removably mounted in elongate slots 12B formed in the end walls 12 of a shaver frame shell 10.

The edge of each plate 12A is grooved and the corresponding edge of each slot 12B is formed with a complementary rib 12C to ensure tight engagement of the plate in the slot.

The head assembly is completed by a cover shell 30.

Assembly and demounting of the heads and mounting arrangement as a unit is readily effected, with the cover shell 10 removed, by sliding the plates 12A into and out of the slots 12B.

Claims

1. A dry shaver comprising a pair of parallel, elongate shaver heads (A,B) mounted on a common shaver frame for movement relative thereto, in use of the shaver, characterized in that the heads, (A,B) are carried at the respective upper ends of a pair of generally vertical, parallel side members (1A,1B) mounted on the frame for vertical movement relative to each other and relative to the frame, whilst constrained to remain parallel with each other, the side members being coupled together below their upper ends by at least one transverse link (2,3) whose opposite ends are pivotally connected to the respective side members and which is pinned intermediate its ends to the frame for pivotal movement about an axis (4 or 6) parallel with those of the shaver heads.

2. A dry shaver according to claim 1, characterized in that the pivotal axis (4 or 6) of the (or each) link (2 or 3) is half-way between and above its connections (7,8 or 9,11) to the respective side members (1A,1B).

3. A dry shaver according to claim 2, characterized in that the said heads (A,B) have arcuate, skin engaging outer surfaces, and a notional plane (N) tangent to those surfaces intersects a vertical plane of symmetry which is mid-way between the heads at the same point (P), in all relative positions of the heads.

4. A dry shaver according to claim 1, 2 or 3, characterized in that one pair of the said side members (1A,1B) and its associated link or links (2,3) are provided at both ends of the shaver heads.

5. A dry shaver according to any preceding claim characterized in that each shaver head (A,B) comprises an outer foil (16) mounted to the shaver frame via the respective frame members (13, 14), in the manner specified and a pair of reciprocating inner cutters (17) are mounted independently on the frame by a drive mechanism (18-29) constructed and arranged to permit the inner cutters (17) to follow the relative movements of the outer foils (16).

6. A dry shaver acording to claim 5 characterized in that the inner cutters (17) are resiliently mounted on yokes (19) having depending leg members (21) connected for pivotal movement, about respective first axes (23), relative to a common mounting member (22) which is in turn connected for pivotal movement about a second axis (24) relative to a drive member (26), the said first and second axes having the same geometrical and spatial relationship with each other as the pivotal connections (4,7,8; 6,9,11) between the (or each) link (2,3), and the side members and shaver frame.

7. A dry shaver according to any preceding claim, characterized in that a single link (2) is provided between the (or each) pair of side members (1A,1B) intermediate the ends thereof and the lower ends of the side members are guided to move in arcuate paths so that the side members are constrained to remain parallel with each other.

8. A dry shaver according to any one of claims 1 to 6, characterized in that the (or each) pair of side members (1A,1B) and its associated link (or links) (2,3) are mounted on a removable portion (12A) of the shaver frame, to enable the said members and link or links, together with the shaver heads carried thereby to be detached as a unit from the shaver.

9. A dry shaver according to any preceding claim, characterized in that the (or each) pair of side members (1A,1B) and its associated link (or links) (2,3) are formed in a unitary plastics moulding, the (or each) link being integrally connected to the side members by flexible hinges (7',8',9',11').

Revendications

1. Rasoir à sec comprenant deux têtes de rasoir parallèles et allongées (A, B) montées sur un châssis de rasoir commun pour un déplacement par rapport à ce dernier, en cas d'utilisation du rasoir, caractérisé en ce que les têtes (A, B) sont supportées par les extrémités supérieures respectives de deux éléments latéraux parallèles (1A, 1B), généralement verticaux, montés sur le châssis pour un déplacement vertical de l'un par rapport à l'autre et par rapport au châssis, tout en étant obligés de rester parallèles l'un à l'autre, les éléments latéraux étant reliés ensemble en dessous de leurs extrémités supérieures par au moins un raccord transversal (2, 3) dont les extrémités opposées sont reliées aux éléments latéraux respectifs de manière à pouvoir pivoter et qui est fixé, entre ses extrémités, au châssis pour un mouvement de pivotement autour d'un axe (4 ou 6) parallèle à ceux des têtes de rasoir.

2. Rasoir à sec suivant la revendication 1, caractérisé en ce que l'axe de pivotement (4 ou 6) du (ou de chaque) raccord (2 ou 3) est à mi-distance entre et au-dessus de ses liaisons (7, 8 ou 9, 11) aux éléments latéraux respectifs (1A, 1B).

3. Rasoir à sec suivant la revendication 2, caractérisé en ce que lesdites têtes (A, B) présentent des surfaces externes arquées, en contact avec la peau, un plan imaginaire (N), tangent à ces surfaces, coupant un plan vertical de symétrie qui est à midistance entre les têtes et le même point (P), dans toutes les positions relatives des têtes.

4. Rasoir à sec suivant l'une quelconque des revendications 1 à 3, caractérisé en ce que deux desdits éléments latéraux (1A, 1B) et leur raccord associé ou leurs raccords associés (2, 3) sont prévus aux deux extrémités des têtes de rasoir.

5. Rasoir électrique suivant l'une quelconque des revendications précédentes, caractérisé en ce que chaque tête de rasoir (A, B) comporte une feuille externe (16) montée sur le châssis de rasoir, via les éléments de châssis respectifs (13, 14), deux couteaux internes (17) à mouvement de va-et-vient étant montés indépendamment sur le châssis par un mécanisme de commande (18–29) construit et agencé pour permettre aux couteaux internes (17) de suivre les mouvements relatifs des feuilles externes (16).

6. Rasoir à sec suivant la revendication 5, caractérisé en ce que les couteaux internes (17) sont montés élastiquement sur des étriers (19) qui présentent des éléments en forme de patte pendant vers le bas (21) reliés pour un mouvement pivotant, autour des premiers axes respectifs (23), par rapport à un élément de montage commun (22) qui est à son tour relié pour un mouvement pivotant, autour d'un second axe (24), par rapport à l'élément de commande (26), lesdits premiers et second axes présentant entre eux le même rapport géométrique et spatial que les liaisons pivotantes (4, 7, 8; 6, 9, 11) entre le (ou chaque) raccord (2, 3) et les éléments latéraux, et le châssis du rasoir.

7. Rasoir à sec suivant l'une quelconque des revendications précédentes, caractérisé en ce qu'un raccord unique (2) est prévu entre la (ou chaque) paire d'éléments latéraux (1A, 1B), entre leurs extrémités, les extrémités inférieures des éléments latéraux étant guidées pour se déplacer selon des trajets arqués de façon que les éléments latéraux soient obligés de rester parallèles entre eux.

8. Rasoir à sec suivant l'une quelconque des revendications 1 à 6, caractérisé en ce que la (ou chaque) paire d'éléments latéraux (1A, 1B) et son raccord associé (ou leurs raccords associés) (2, 3) sont montés sur une portion détachable (12A) du châssis de rasoir pour permettre que ledits éléments et le raccord ou les raccords soient détachés du rasoir en même temps que les têtes de rasoir supportées par ces derniers, sous la forme d'un module.

9. Rasoir à sec suivant l'une quelconque des revendications précédentes, caractérisé en ce que la (ou chaque) paire d'éléments latéraux (1A, 1B) et son raccord associé (ou ses raccords associés) (2, 3) sont formés dans un moulage plastique unitaire, le (ou chaque) raccord étant intégralement relié aux éléments latéraux par des charnières flexibles (7', 8', 9', 11').

Patentansprüche

1. Trockenrasiergerät mit einem Paar parallel zueinander angeordneter, länglich ausgebildeter Scherköpfe (A, B), die auf einem gemeinsamen Scherkopfrahmen bei Betrieb des Rasiergeräts relativ dazu bewegbar befestigt sind, dadurch gekennzeichnet, daß die Scherköpfe (A, B) an den jeweils oberen Enden eines Paars von im allgemeinen senkrechten, parallel zueinander angeordneten Seitenteilen (1A, 1B) gelagert sind, die am Rahmen in vertikaler Richtung relativ zueinander und relativ zum Rahmen bewegbar befestigt sind, während ihre Parallelanordnung zwangsläufig erhalten bleibt, wobei die Seitenteile unterhalb ihrer oberen Enden durch mindestens ein Quergelenk (2, 3) miteinander gekoppelt sind, dessen gegenüberliegende Enden mit dem jeweiligen Seitenteil schwenkbar verbunden

sind und das zwischen seinen Enden um eine zu den Achsen der Scherköpfe parallel verlaufende Achse (4 oder 6) schwenkbar am Rahmen befestigt ist.

2. Trockenrasiergerät nach Anspruch 1, dadurch gekennzeichnet, daß sich die Schwenkachse (4 oder 6) des Gelenks (oder der Gelenke) (2 oder 3) in der Mitte des Abstandes zwischen den Verbindungen (7, 8 oder 9, 11) mit den jeweiligen Seitenteilen (1A, 1B) und oberhalb davon befindet.

3. Trockenrasiergerät nach Anspruch 2, dadurch gekennzeichnet, daß die Scherköpfe (A, B) bogenförmige, mit der Haut in Anlage tretende Außenflächen aufweisen und daß eine an diese Flächen gelegte gedachte Tangentialebene (N) eine senkrechte Symmetrieebene schneidet, die unabhängig von der Relativstellung der Scherköpfe stets durch den Punkt (P) in der Mitte des Abstandes zwischen den Scherköpfen verläuft.

4. Trockenrasiergerät nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, daß ein Paar der Seitenteile (1A, 1B) und dessen zugehöriges Gelenk oder Gelenke (2, 3) an beiden Enden der Scherköpfe angeordnet sind.

5. Trockenrasiergerät nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Scherköpfe (A, B) jeweils eine über die entsprechenden Rahmenteile (13, 14) am Scherkopfrahmen befestigte äußere Scherfolie (16) aufweisen und daß ein Paar in hin- und hergehende Bewegung versetzbare Untermesser (17) auf dem Rahmen unabhängig mittels eines Antriebsmechanismus (18–29) gelagert ist, der in der Weise aufgebaut und angeordnet ist, daß die Untermesser (17) in der Lage sind, den Relativbewegungen der oberen Scherfolien (16) zu folgen.

6. Trockenrasiergerät nach Anspruch 5, dadurch gekennzeichnet, daß die Untermesser (17) jeweils auf einem Joch (19) federnd gelagert sind, dessen sich nach unten erstreckende Schenkel (21) um erste Achsen (23) schwenkbar mit einem gemeinsamen Trägerrahmen (22) verbunden sind, wobei der Trägerrahmen seinerseits um eine zweite Achse (24) schwenkbar mit einem Antriebsblock (26) verbunden ist, wobei die ersten Achsen und die zweite Achse im gleichen geometrischen und räumlichen Verhältnis zueinander liegen wie die Schwenkverbindungen (4, 7, 8; 6, 9, 11) zwischen dem Gelenk (oder den Gelenken) (2, 3) und den Seitenteilen und dem Scherkopfrahmen.

7. Trockenrasiergerät nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß ein einzelnes Gelenk (2) zwischen dem Paar (oder den Paaren) von Seitenteilen (1A, 1B) zwischen deren Enden angeordnet ist und daß die unteren Enden der Seitenteile auf einer bogenförmigen Bahn geführt werden, so daß die Parallelanordnung der Seitenteile zwangsläufig erhalten bleibt.

8. Trockenrasiergerät nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß das Paar (oder die Paare) von Seitenteilen (1A, 1B) und dessen zugehöriges Gelenk (oder deren Gelenke) (2, 3) auf einem abnehmbaren Teil (12A) des Scherkopfrahmens befestigt sind, so daß sich die Seitenteile und das Gelenk bzw. die Gelenke, zusammen mit den darauf gelagerten Scherköpfen, als eine Einheit vom Rasiergerät abnehmen lassen.

9. Trockenrasiergerät nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das Paar (oder die Paare) von Seitenteilen (1A, 1B) und dessen zugehöriges Gelenk (oder deren Gelenke) (2, 3) in einem einheitlichen Formteil aus Kunststoff ausgebildet sind, wobei das Gelenk (oder die Gelenke) und die Seitenteile über elastische Scharniere (7', 8', 9', 11') einstückig miteinander verbunden sind.

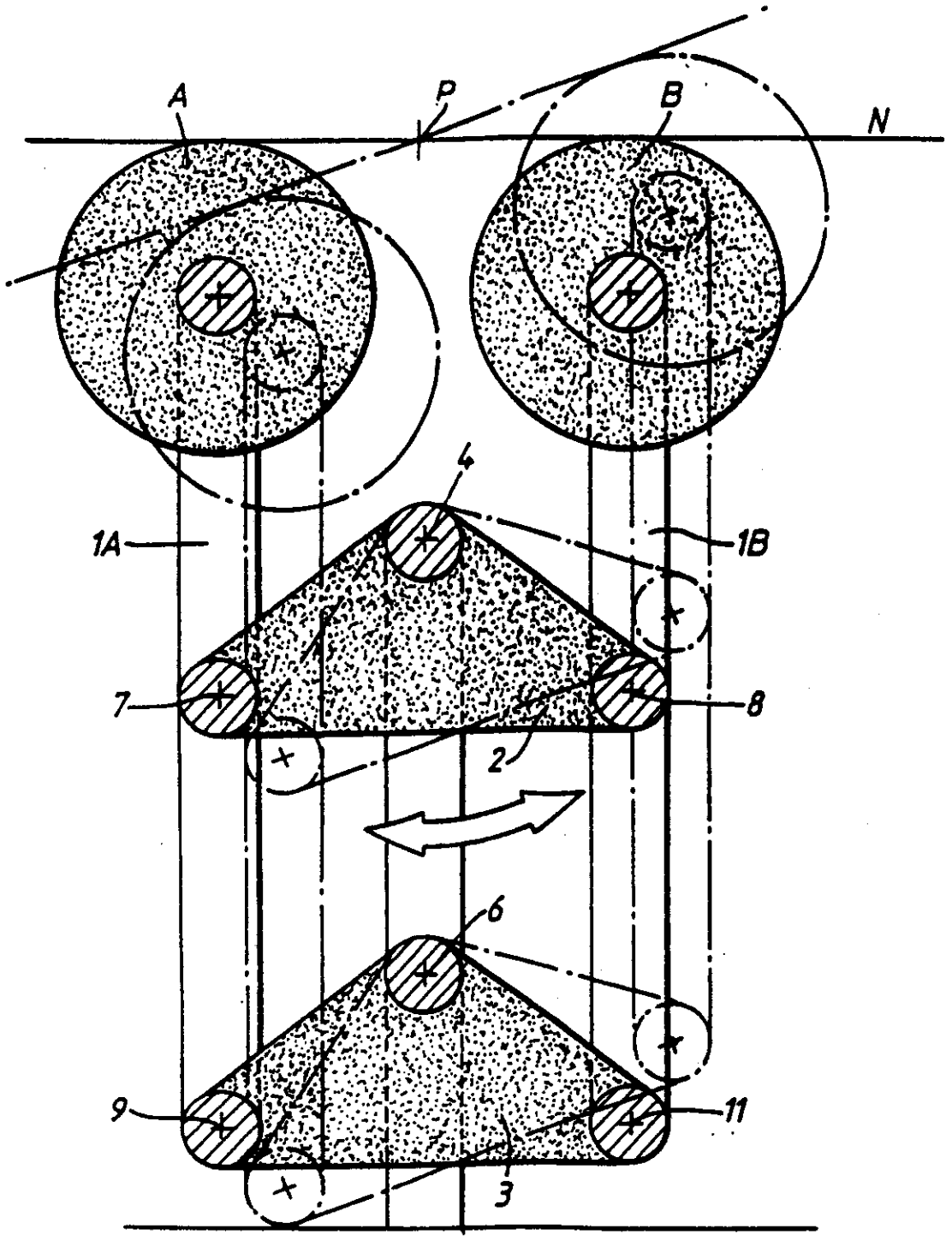

FIG.I.

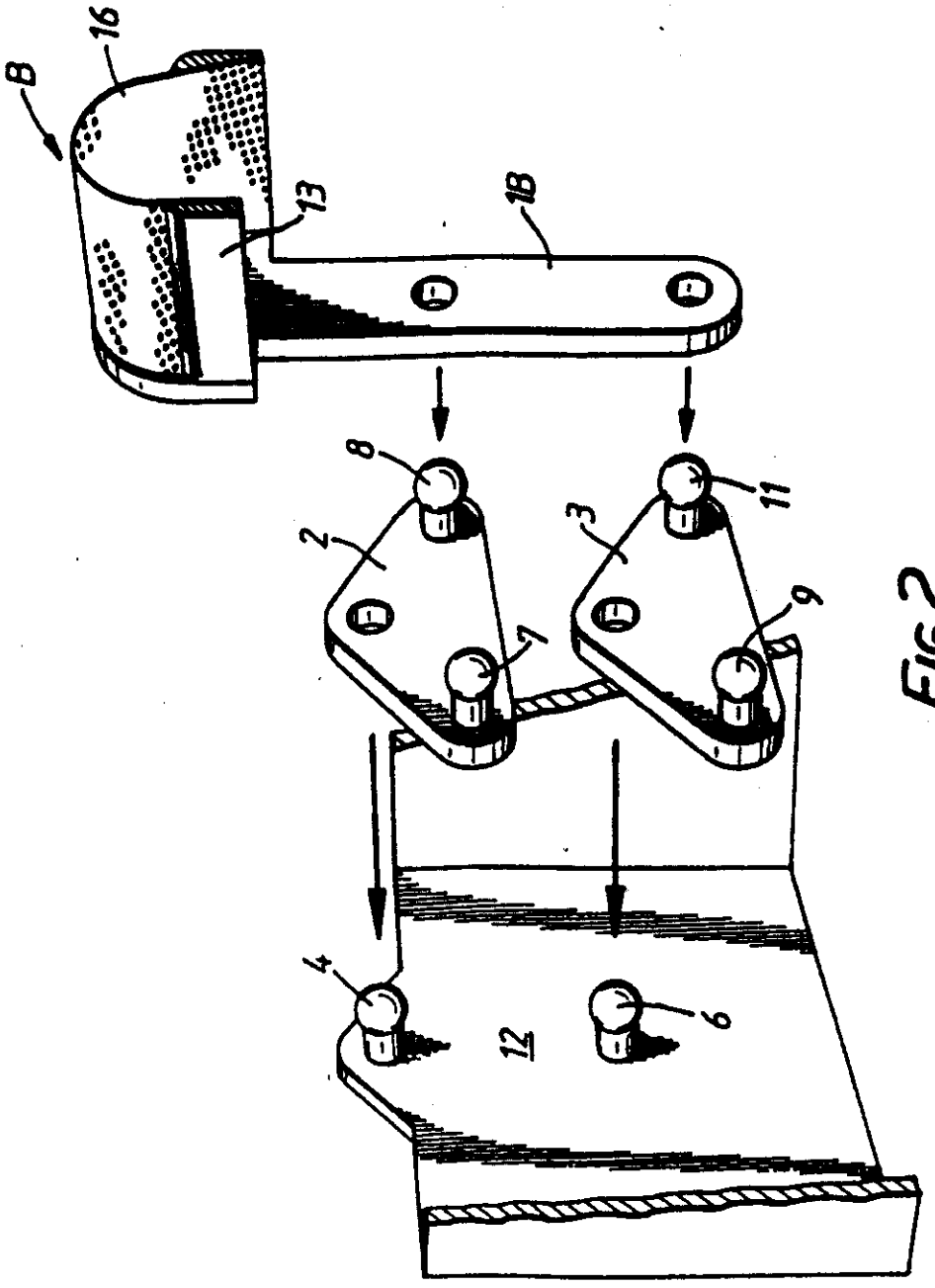

FIG.2.

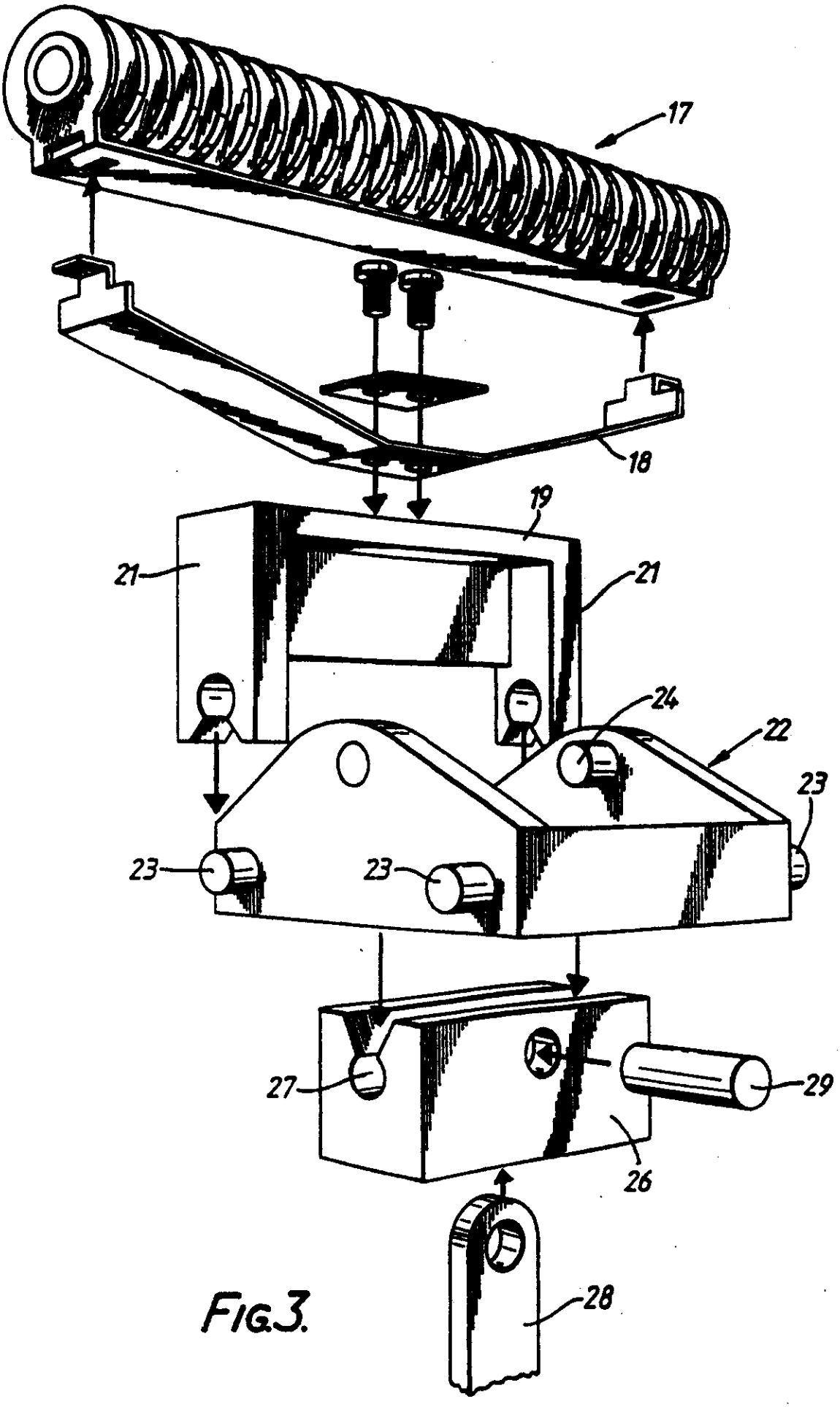

FIG.3.

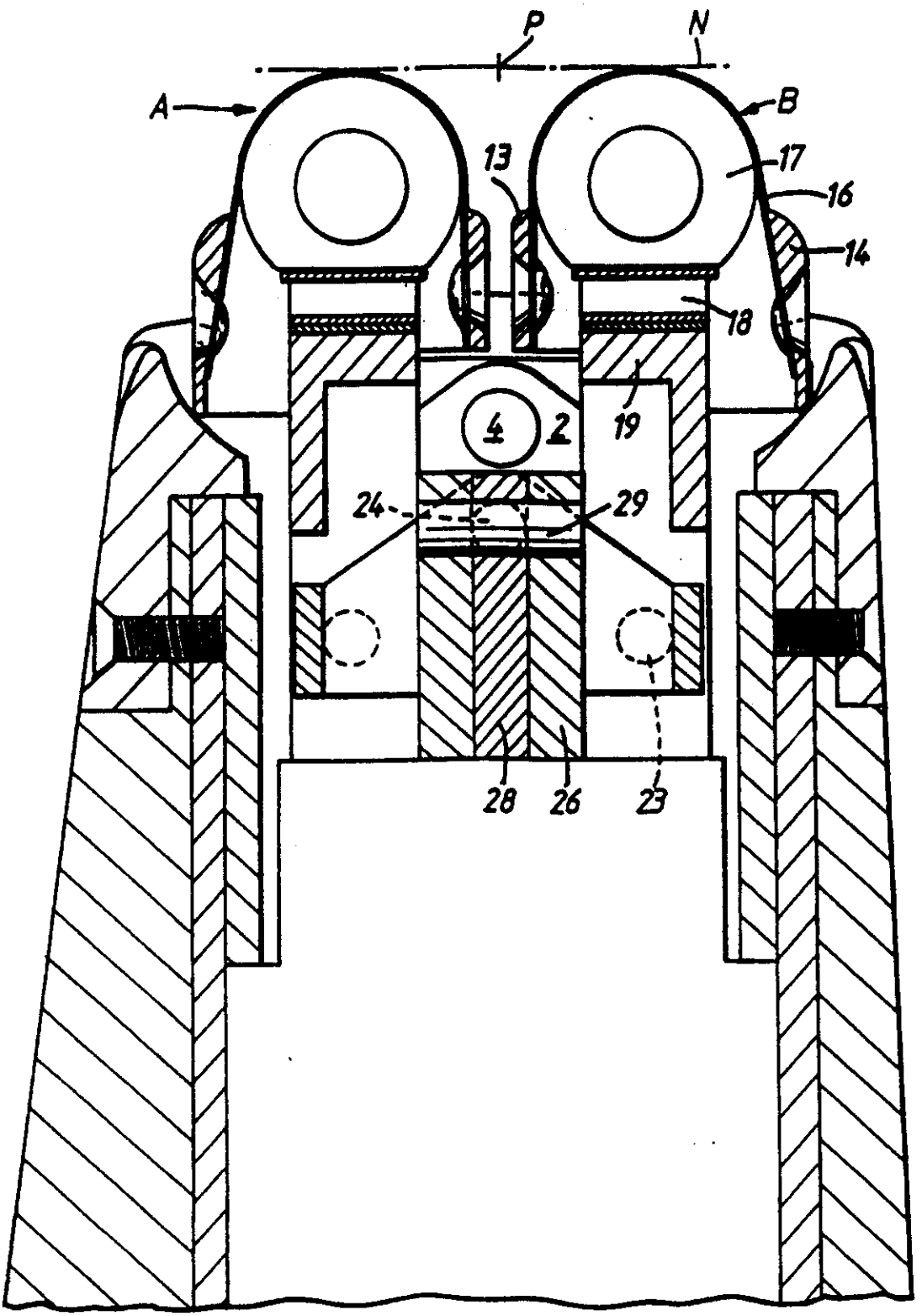

FIG.4.

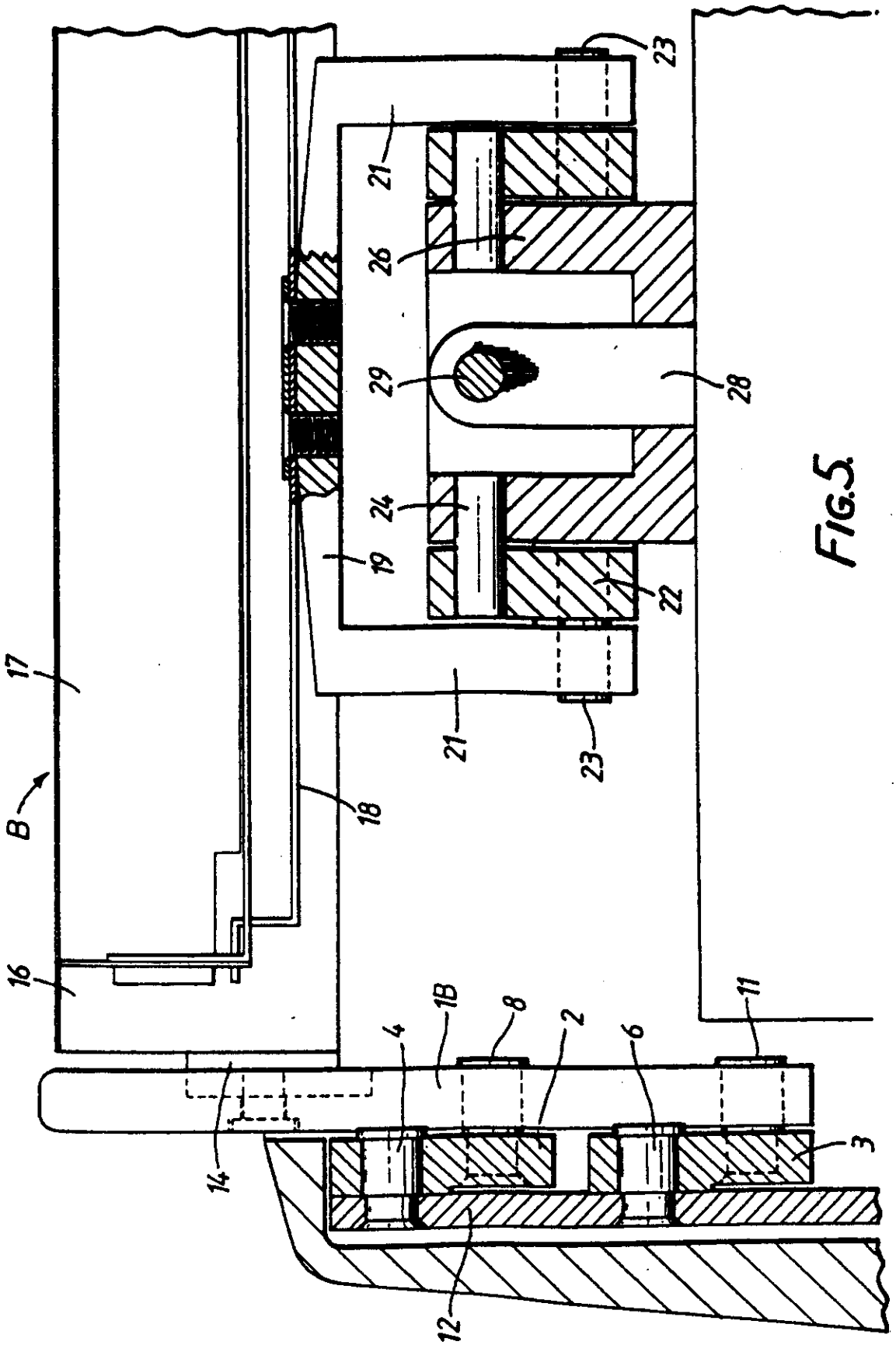

FIG.5

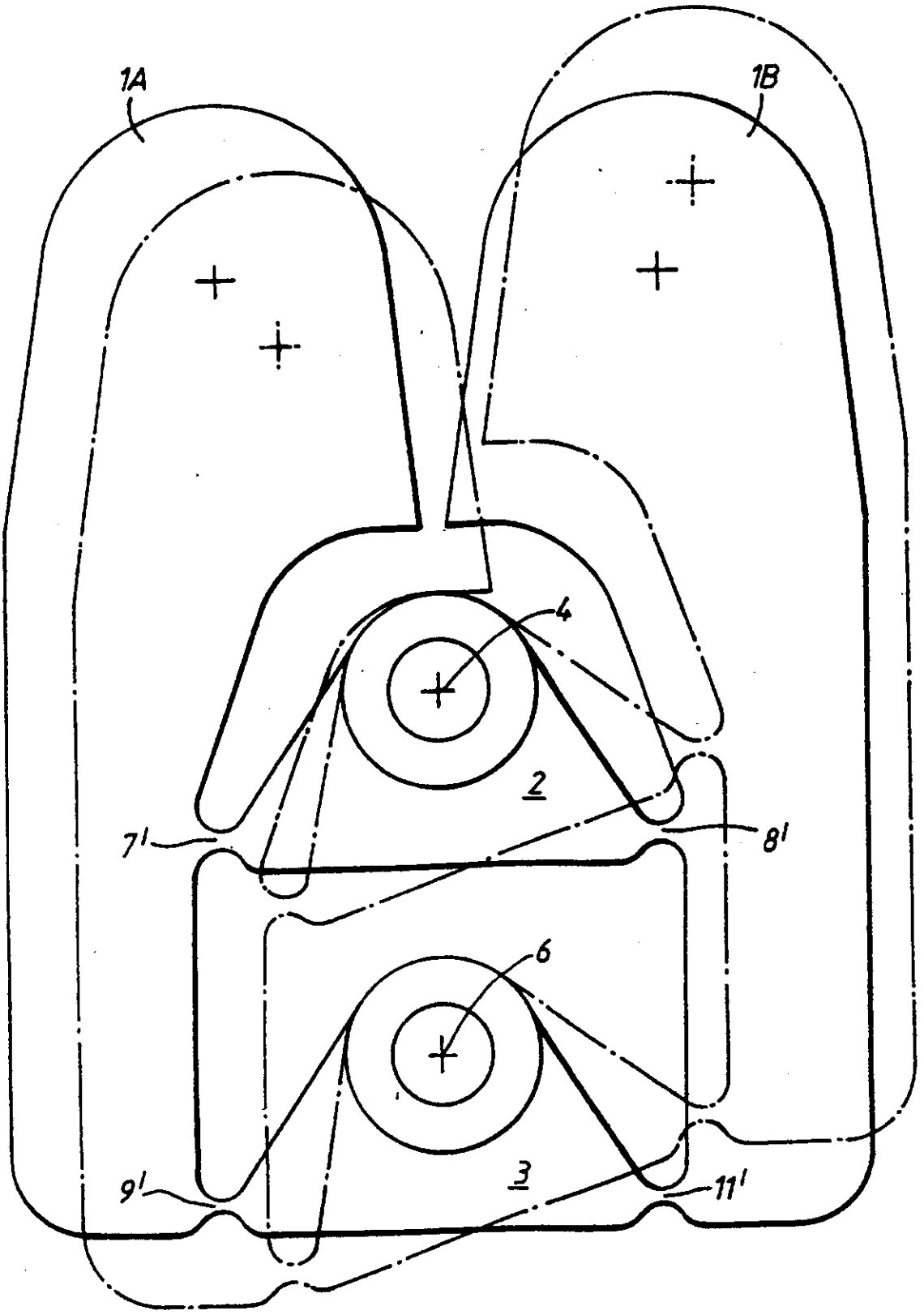

FIG.6.

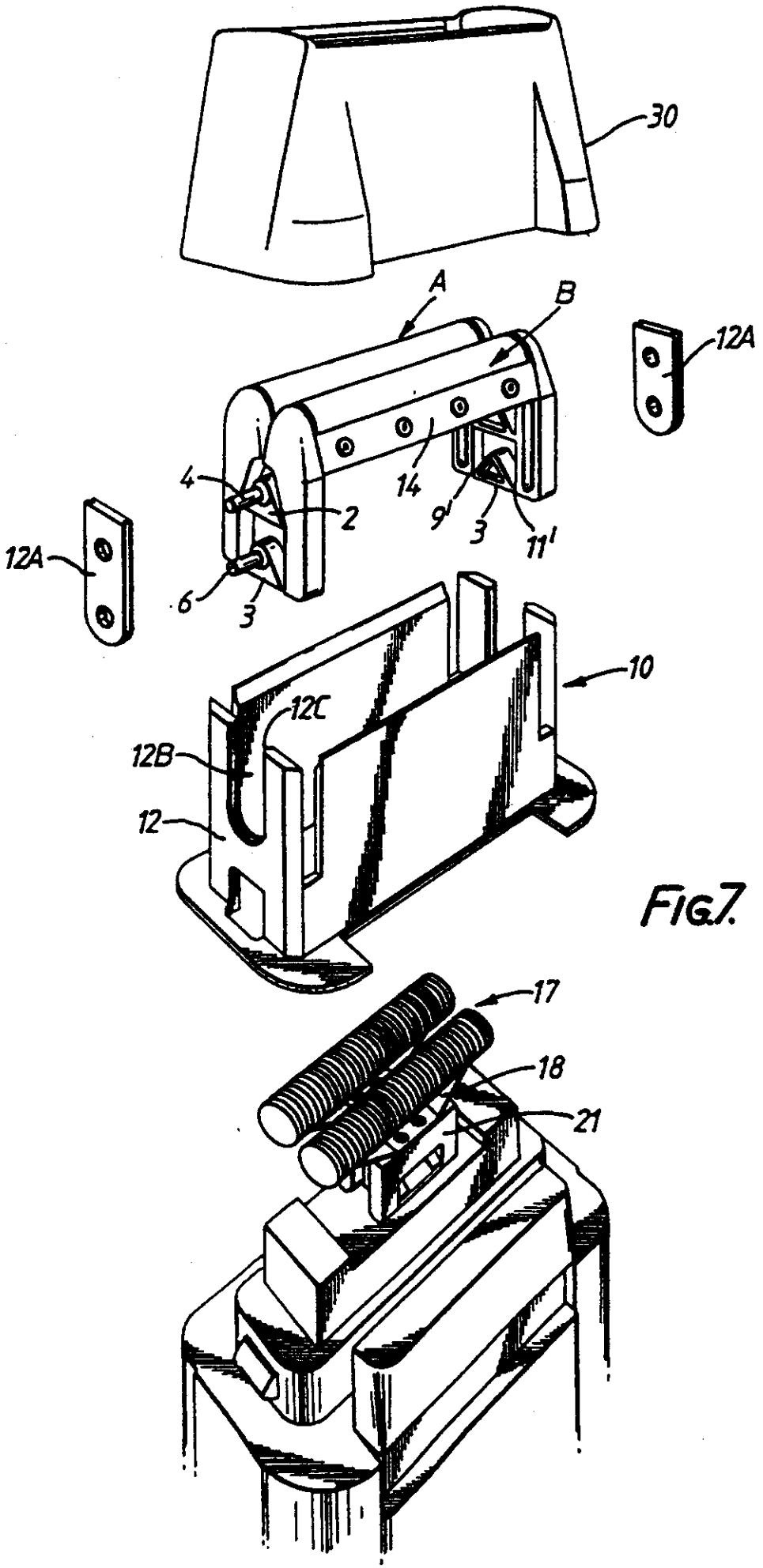

FIG.7.

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Title DRY SHAVERS

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