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Description

The present invention relates to a polishing apparatus comprising a portable main body housing a driving source, a rotating shaft which extends out of the main body through a base member, a second rotating shaft rotationally driving a polishing member, said base member supporting spring biased guide members disposed laterally of the polishing member, as disclosed in DE—C—910,146.

In this known portable grinding or polishing apparatus the said laterally disposed guide members are supported resiliently in vertical direction only.

The object of the invention is a portable polishing apparatus of the kind referred to above, which is better suited for polishing curved surfaces such as the painted surfaces of automobiles when they are to be repainted.

According to the invention the apparatus is characterised by an adjustment member for the guide members, said adjustment member being a U-shaped member having legs, the ends of which are pivotally supported on the base member such that the adjustment member can be angularly displaced about an axis perpendicular to the rotating drive shaft said adjustment member being further supported above said base member by a support strip engaging the mid-portion of the adjustment member and being limitedly movably connected to said base member, said legs of the adjustment member carrying laterally projecting abutments having downwardly sloping abutment faces cooperating with the upper ends of levers which are pivotally supported on said base member about the axis extending perpendicular to the rotating drive shaft, said levers carrying at their lower ends the guide members in the form of guide rollers rotatable about axes parallel to said lever pivot axis.

In the apparatus according to the invention the guide means provide for a better guidance over curved surfaces because they are adjustable not only vertically but also angularly and since they are able to absorb vibrations they enable a stable operation of the polishing member. Therefore the polishing apparatus as disclosed is suitable for uniformly working painted automobile surfaces with better results than can be attained manually with sandpaper and the like.

In order to easily adjust the position of the polishing member relative to the guide rollers, said support strip may be adjustably connectable to said mid-portion of said adjustment member by means of a clamping device.

In a preferred embodiment of the invention, the polishing member comprises a pair of rigid support plates, one of the support plates being disposed on the lower position with respect to the axis of rotation and being formed with the polishing face, and an elastic body sandwiched between the pair of rigid support plates.

Because of the elastic body on the polishing member, surface having a small curvature radius

can be smoothly polished for the entire area thereof. Furthermore, since the polishing face is supported by a rigid plate, slight unevenness on a surface to be polished can be removed and polished.

The features and advantages of the invention will be apparent from the following description of the preferred embodiment taken in conjunction with the appended claims and the accompanying drawing figures wherein:

Fig. 1 is a side elevation of an embodiment of the invention;

Fig. 2 is a top plain view of an embodiment of the invention;

Fig. 3 is a front elevation of an embodiment of the invention;

Fig. 4 is a perspective view showing in detail a roller employed as a guide member and the vicinities thereof of the invention;

Fig. 5 is a plain view showing an arrangement of a pair of guide rollers and the construction relative thereto of the invention;

Fig. 6 is a sectional view showing in detail the vicinities of a movable element;

Fig. 7 is an elevational view showing a movement of the movable member;

Fig. 8 is a sectional view showing the vicinities of a rotational shaft;

Fig. 9 is a sectional view showing a polishing member and the vicinities thereof;

Fig. 10 is a plain view showing a bottom face of the polishing member;

Fig. 11 through Fig. 13 are simplified views illustrating modes of operation of the polishing apparatus;

Fig. 14 is a simplified view illustrating a movement of the polishing face.

As shown in Fig. 1, a main body 1 forms substantially "L" and a connecting end 2 on the main body 1 receives pressurized air which drives an air pressure motor 3 integrated in the main body 1. By this air pressure motor 3 a polishing member 4 is rotated about the vertical axis of rotation, and a polishing face 5 is formed in a plane perpendicular to the axis. Dust produced by the polishing operation using the polishing member 4 thus formed is absorbed towards a vacuum source through a bottom portion 6 on the main body 1 and a connecting end 7. The connecting ends 2 and 7 are respectively connected with flexible tubes.

The polishing apparatus according to the invention is formed symmetric with respect to a plane which contains the vertical axis of rotation of the polishing member 4. A base member 8 formed at the bottom of the main body 1 protrudes radially outwardly of the main body 1. As also shown in Figs. 4 and 5 the base member 8 has a pair of circumferentially spaced brackets 9 and 10 and another pair of circumferentially spaced brackets 11 and 12 opposite to the pair of brackets 9 and 10. The brackets 9 and 11 substantially have the shape of the letter L as viewed from the horizontal plane. To these brackets 9 and 11 a U-shaped adjusting member 14 is attached at both the ends

thereof by pins 13 and 81. These ends are fixed on the brackets 9 and 11 in such a way that the adjusting member 14 can be angularly displaced about the axis that is perpendicular to the axis of rotation. On legs 14a and 14b of the adjusting member 14 abutting projections 15 and 16 are formed respectively. The abutting projection 15 has an abutting surface 17 which is inclined towards the axis of rotation as it lowers. The other abutting projection 16 is identical in shape with the abutting projection 15.

The bracket 9 is provided with a screw bar 18 whose axis extends perpendicular to the axis of rotation and the axis of the pin 13, and which passes through a through hole 19. One end of the screw bar 18 passes through a through hole 20 formed on the bracket 10 and E rings 21 and 22 provided thereon prevent the bar 18 from axial displacements. A roller 23 playing the role of a guide member is rotatably held on a support leg 25 of an operating member 24 about an axis parallel to the screw bar 18. An adjusting portion 26 formed in an upper portion of the operating member 24 and bent toward it can make contact with the tilted surface 17 of the abutting projection 15. At a meeting point of the leg 25 with the adjusting portion 26 there is formed a pair of tapped holes 27 in a spaced relation. These tapped holes 27 receive the screw bar 18. By rotating a knob 28 of the screw bar 18 the operating member 24 and the guide roller 23 can be moved along the axis of the screw bar 18. Between said tapped holes 27 for the screw bar 18 a coil spring 100 is disposed around the bar 18, and one end of the coil spring 100 is supported by the base member 8 and the other end of the same is supported on the surface of the operating member 24 which is facing to the base member 8. By this coil spring 100 the operating member 24 is given force away from the base member 8 and consequently, the adjusting member 26 is always given force repulsive to the tilted surface 17. Furthermore a spring 119 is provided around the screw bar 18 between the knob 28 and the bracket 9 to thereby cause the smooth rotation of the screw bar 18. The same construction is provided with respect to the leg 14b in which an operating member 29, a guide roller 30, and an abutting projection 16 having an abutting surface 31 are similarly provided. Likewise, by rotating a knob 32 of the screw bar 33 which is provided with a spring 120 therearound between the knob 32 and the bracket 11, the operating member 29 can be moved along said operating member 24 in parallel.

As clearly shown in Fig. 6, approximately at the center of the adjusting member 14 there is formed a ring unit 34. At a fixed wall 36 located opposite to a holder 35 on the body side a nut 37 is disposed. A fixing screw bar 38 screwed in this nut 37 protrudes toward the holder 35. The screw bar 38 is rotated through a knob 39. One end 40 of the screw bar 38 can make contact with a movable element 41 which is fixed to the base member 8. By the end 40 of the screw bar 38 the movable

element 41 can be firmly sandwiched between the end 40 and the holder 35 whereby the angular displacement positions of the adjusting member 14 about the axis of 13 (81) can be set. Through this setting the angular displacement positions of the operating members 24 and 29 about the axes of the screw bar 18 and 33 are determined. Accordingly the positional relationship between the lower surfaces of the rollers 23, 30 and the polishing face 5 of the polishing member 4 can be adjusted so that the polishing face 5 will protrude slightly lower than the lower surfaces of the rollers 23, 30 or it is flush with the surfaces.

At the lower end 41a of the movable member 41 there is formed a slot 102 extending vertically with respect to Fig. 6. A screw 103 for fixing the movable element 41 to the base member 8 is screwed in a tapped hole 104 of the base member 8 through this slot 102. The relation between the diameter I1 of the slot 102 and the I2 of the screw 103 is expressed by $I1 > I2$ and, therefore the movable element 41 is allowed to move by way of the screw 103 by the distance I1-I2. By this movement the adjusting member 14 can be slightly displaced angularly about the axes of the pins 13 and 81 with the movable element 41 being sandwiched between the end 40 of the screw bar 38 and the holder 35. In other words, the adjusting member 14 is fixed to the base member 8 with a certain play therebetween. When vibrations caused by a surface 70 to be polished are transferred from the rollers 23, 30 to the projections 15, 16 of the adjusting member 14 through the operating members 24, 29 and the adjusting members 26, 29a shown in Fig. 7 during polishing work, the play of the movable element 41 serves to make the vibrations absorbed by the adjusting member 14, thereby achieving a stable rotating operation of the polishing member 4. In addition, since the rollers 23 and 30 are individually installed from each other, vibrations on one roller 23 or 30 will not be transferred to the other roller 30 or 23 but will be fully absorbed by the adjusting member 14, a remarkable improvement in work is accomplished.

Fig. 8 shows a sectional view showing the vicinities of a rotating shaft 89. The radial force of the rotating shaft 89 is supported by bearings 90 and 91. The rotating shaft 89 is rotatably driven by a rotor 92, and a rotating cylinder 93 is fixed to the lower end of the rotating shaft 89 by means of a jig 94. Inside the rotating cylinder 93 a rotating shaft 57 is rotatably disposed through a bearing 95 so as to be eccentric by distance d with respect to the axis of the rotating shaft 89. On the rotating shaft 57 a screw 57a which is fixed to the polishing member 4 integrally is screwed coaxially. By disposing the shaft 57 and 89 eccentrically to each other, the polishing face 5 of the polishing member 4 can be driven to move as shown in Fig. 14. The driving mechanism of the polishing member 4 is not limited to the one shown in Fig. 8 but other driving mechanisms such as gives a single circular movement may be employed.

Fig. 9 is an enlarged view of the polishing

member 4 and the vicinities thereof. An elastic pad 50 made of rubber, sponge and the like is sandwiched between a rigid support plate 51 of metal or the like and a rigid support plate 52 having the polishing face 5. The support plate 52 comprises a rigid plate 53 made of bakelite or the like and sand paper 54, which has the polishing face 5, bonded to the rigid plate 53 with an adhesive agent. A cavity 55 formed within the main body 1 is communicated with the connecting end 7 for absorbing fine dust of the painted surfaces of automobile bodies produced during polishing work by the polishing face 5 whereby working environment is properly maintained. To improve the absorbing efficiency of dust produced, the polishing member 4 is specifically provided with a plurality of suction holes 56 which are bored through the polishing member 4 in the thicknesswise direction thereof and are circumferentially spaced at intervals. A screw stud 57a mounted on the centre of the support plate 51 is screwed in the rotating shaft 57 to connect the polishing member 4 to the shaft 57. The motor 3 is supplied with pressurized air for driving the polishing member 4 to rotate by depressing an operating lever 58, which is mounted on the top of the main body 1, around an axis of a pin 59 so as to press a knob 60. The lever 58 is reset to its original position by a spring not shown. Another lever 61 is adapted to be angularly displaced. By operating the lever 61, air flow rate to be supplied to the motor 3 can be varied, thereby changing the rotating speed of the motor 3.

With the guide rollers 23 and 30 being in contact with the body of an automobile to be polished, the polishing face 5 of the polishing member 4 rotating polishes the surface of the body. In the case where the surface 70 to be polished has an outwardly protruding cylindrical portion, by placing the rollers 23 and 30 parallel to the circumferential direction of the cylindrical portion as shown in Fig. 11, that is, parallel to a direction shown by a curved arrow 71 in Fig. 11, the entire peripheral area of the outwardly protruding cylindrical portion in the surface 70 can be positively uniformly polished. In addition, by adjusting the screw bars 18 and 33 with respect to the axial positions thereof through the rotation of the knobs 28 and 32, a surface 70 to be polished having a stepped portion 70a as shown in Fig. 12 can be fully polished.

Since the support plate 52 having the polishing face 5 is fixed to the rigid support plate 51 through the elastic body 50, a somewhat uneven surface 70 can be polished to be even because of this rigidity. The elastic body 50 contributes, on the other hand, to smoothly polish a surface 70 having a small curvature radius as shown in Fig. 13 for the entire area thereof. Furthermore, polishing wherein the outer edge of the polishing face 5 is employed can be effected because of the elasticity of the elastic body 50, and whereby the operator can always check the condition of the surface being

polished, so that excellent finish can be attained.

As other embodiments of the present invention, other type of driving source for operating the polishing member may be used in place of the air pressure motor 3.

The present embodiment is to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description and all changes which come within the scope of the claims are therefore intended to be embraced therein.

Claims

1. A polishing apparatus comprising a portable main body (1) housing a driving source (3), a rotating shaft (57) which extends out of the main body (1) through a base member (8), a second rotating shaft (89) rotationally driving a polishing member (4), said base member (8) supporting spring (100) biased guide members (23, 30) disposed laterally of the polishing member (4), characterized by an adjustment member (14) for the guide members (23, 30), said adjustment member (14) being a U-shaped member having legs (14a, 14b), the ends of which are pivotally supported on the base member (8) such that the adjustment member (14) can be angularly displaced about an axis (13-81) perpendicular to the rotating drive shaft (57), said adjustment member (14) being further supported above said base member (8) by a support strip (41) engaging the mid-portion of the adjustment member and being limitedly movably connected (102, 104) to said base member (8), said legs (14a, 14b) of the adjustment member (14) carrying laterally projecting abutments (15, 16) having downwardly sloping abutment faces (17, 31) cooperating with the upper ends of levers (26, 24; 29a, 29) which are pivotally supported on said base member (8) about the axis (18, 33) extending perpendicular to the rotating drive shaft (57), said levers carrying at their lower ends the guide members in the form of guide rollers (23, 30) rotatable about axes parallel to said lever pivot axis (18, 33).

2. Apparatus according to claim 1, characterized in that said support strip (41) is adjustably connectable to said mid-portion of said adjustment member (14) by means of a clamping device (35-39).

3. Apparatus according to claim 1 or 2, characterized in that the polishing member (4) comprises a pair of rigid support plates (51, 52), one (52) of which being disposed on the lower position with respect to the axis of rotation and being formed with the polishing face (5), an elastic body (50) being sandwiched between the pair of rigid support plates (51 and 52).

Patentansprüche

1. Poliergerät mit einem tragbaren Hauptteil

(1), in dem eine Antriebseinheit (3) vorgesehen ist und mit einer ersten Welle (57), die durch ein Trägerelement (8) hindurch aus dem Hauptteil (1) herausragt, sowie mit einer zweiten Welle (89), die ein Polierglied (4) rotierend antreibt, wobei am Trägerelement (8) federnd angelenkte Führungsteile (23, 30) seitlich des Poliergliedes (4) angeordnet sind, dadurch gekennzeichnet, daß ein U-förmiges Justierglied (14) mit Schenkeln (14a, 14b) zur Führung der Führungsteile (23, 30) vorgesehen ist, daß die Enden der Schenkel (14a, 14b) am Trägerelement (8) um eine Achse (13, 81), die senkrecht zur Welle (57) verläuft, schwenkbar gelagert sind, daß ferner das Justierglied (14) oberhalb des Trägerelements (8) von einem Befestigungsstab (41) an der Basis des U-förmigen Justiergliedes (14) getragen ist und in begrenztem Umfang relativ zum Trägerelement (8) verschiebbar ist, daß die Schenkel (14a, 14b) des Justiergliedes (14) quer angebrachte Stützbalken (15, 16) mit nach unten und innen geneigten Stützflächen (17, 31) aufweisen, die mit den oberen Enden von Hebeln (26, 24; 29a, 29) zusammenwirken und die Hebel (26, 24; 29a, 29) am Trägerelement (8) um je eine senkrecht zur Welle (57) verlaufende (waagrechte) Achse (18, 33) schwenkbar gelagert sind, und daß an den unteren Enden der Hebel (26, 24; 29a, 29) Führungselemente in Form von Führungsrollen (23, 30) um je eine parallel zur Hebelachse (18, 33) verlaufende Achse drehbar angeordnet sind.

2. Gerät nach Anspruch 1, dadurch gekennzeichnet, daß der Befestigungsstab (41) an der Basis des U-förmigen Justiergliedes (14) mittels einer Klemmeinrichtung (35 bis 39) verstellbar zu befestigen ist.

3. Gerät nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß das Polierglied (4) zwei starre Trägerplatten (51, 52) aufweist, von denen eine (52) dem Ende der Welle (57) abgewandt und mit einer Polierschicht (5) versehen ist, und daß zwischen beiden (51, 52) ein elastischer Körper (50) vorgesehen ist.

Revendications

1. Appareil de polissage comprenant un corps

principal portable (1) abritant une source d'entraînement (3), un arbre tournant (57) qui s'étend hors du corps principal (1) à travers un organe de soutien (8), un second arbre tournant (89) entraînant en rotation un organe de polissage (4), ledit organe de soutien (8), des organes de guidage (23, 30) rappelés par un ressort (100) et disposés latéralement à l'organe de polissage (4), caractérisé par un organe de réglage (14) pour les organes de guidage (23, 30), cet organe de réglage (14) étant un organe à profil en "U" ayant des branches (14a, 14b) dont les extrémités sont montées pivotantes sur l'organe de soutien (8), de sorte que l'organe de réglage (14) peut être déplacé angulairement autour d'un axe (13, 81) perpendiculaire à l'arbre d'entraînement en rotation (57), cet organe de réglage (14) étant en outre supporté au-dessus dudit organe de soutien (8) par une bande de support (41) s'engageant dans la partie médiane de l'organe de réglage, et étant réunie à l'organe de soutien (8) pour être mobile de façon limitée (102, 104), lesdites branches (14a, 14b) de l'organe de réglage (14) portant des butées se projetant latéralement et ayant des faces de butée (17, 31) inclinées vers le bas coopérant avec les extrémités supérieures de leviers (26, 24; 29a, 29) qui sont montés pivotant sur ledit organe de soutien (8) autour d'axes (18, 33) s'étendant perpendiculairement à l'arbre d'entraînement en rotation (57), ces leviers portant à leurs extrémités inférieures les organes de guidage sous la forme de rouleaux de guidage (23, 30) pouvant tourner autour d'axes parallèles auxdits axes de pivotement des leviers (18, 33).

2. Appareil selon la revendication (1) caractérisé en ce que la bande de support (41) est réunie de façon réglable à ladite partie médiane de l'organe de réglage (14) au moyen d'un dispositif de bridage (35—39).

3. Appareil selon la revendication 1 ou 2 caractérisé en ce que l'organe de polissage (4) comprend une paire de plateaux porteurs rigides (51, 52), l'un d'eux (52) étant disposé à une position inférieure par rapport à l'axe de rotation et étant réalisé avec un face de polissage (5), un corps élastique (50) étant intercalé entre la paire de plateaux porteurs rigides (51 et 52).

Fig. 1

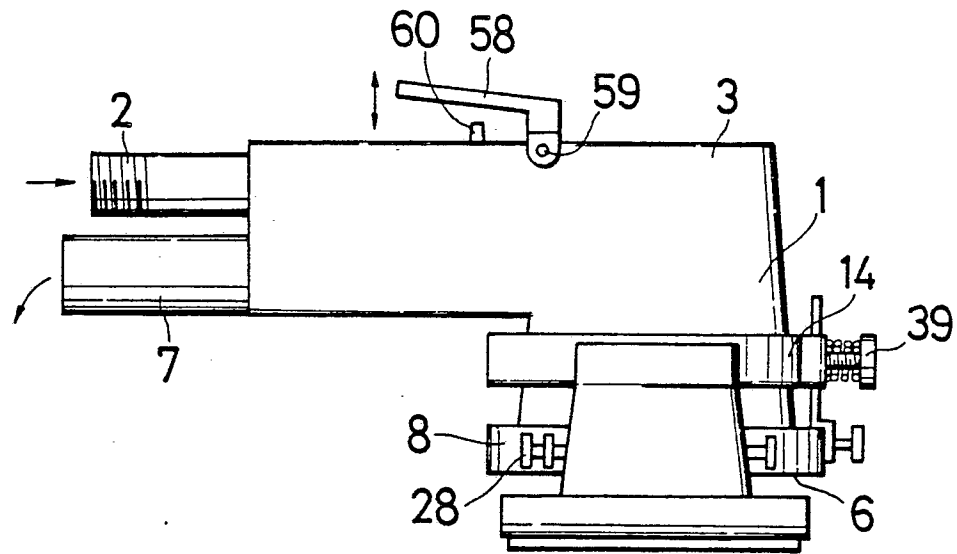


Fig. 3

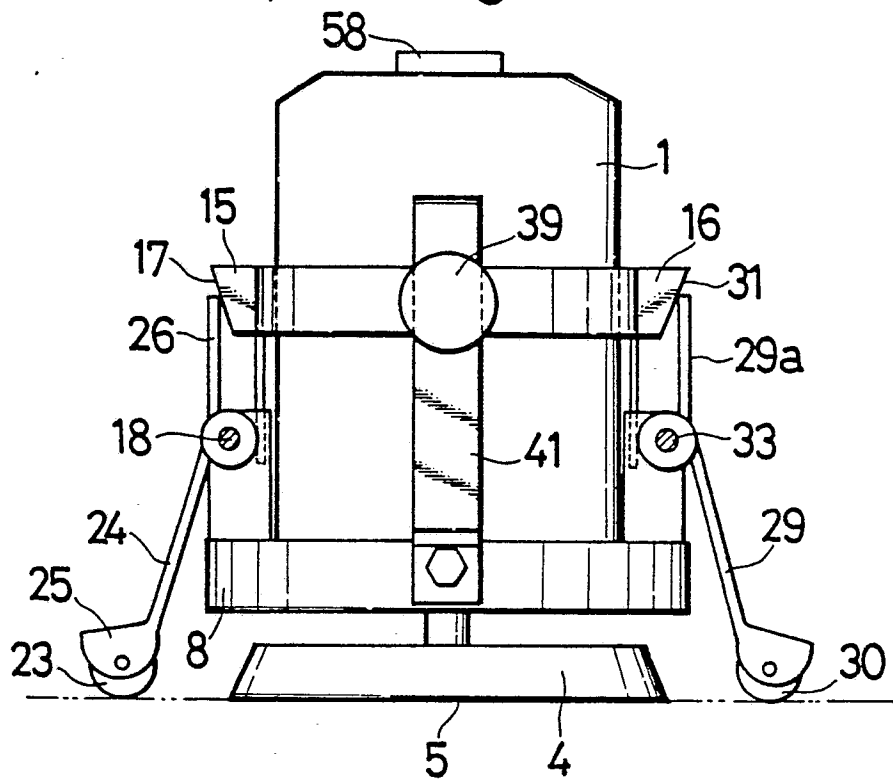


Fig. 2

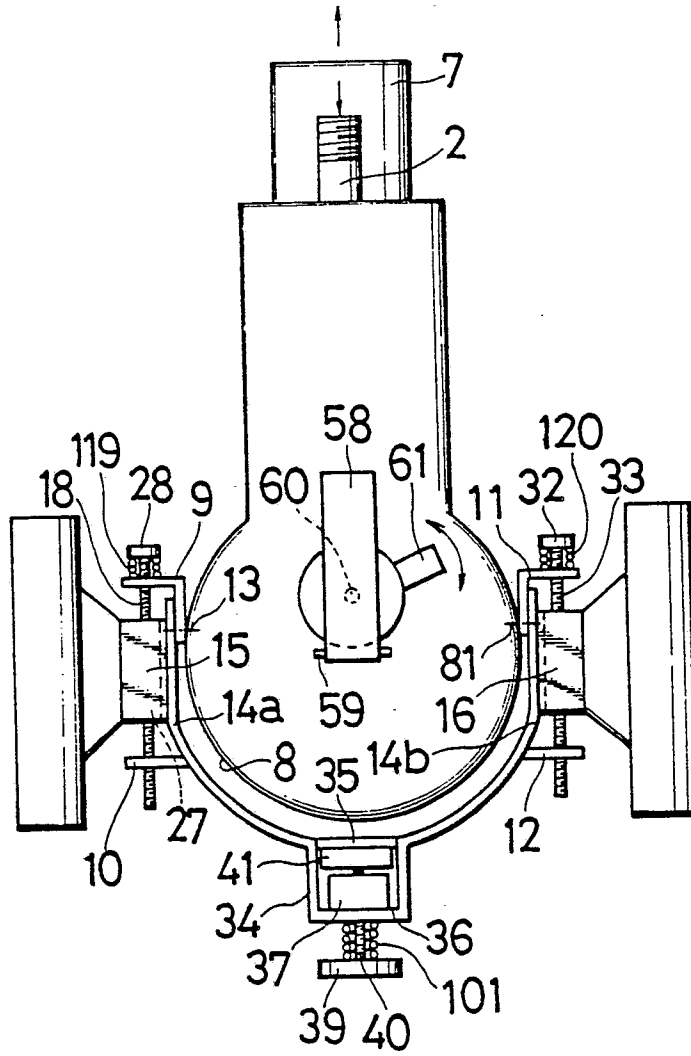


Fig. 4

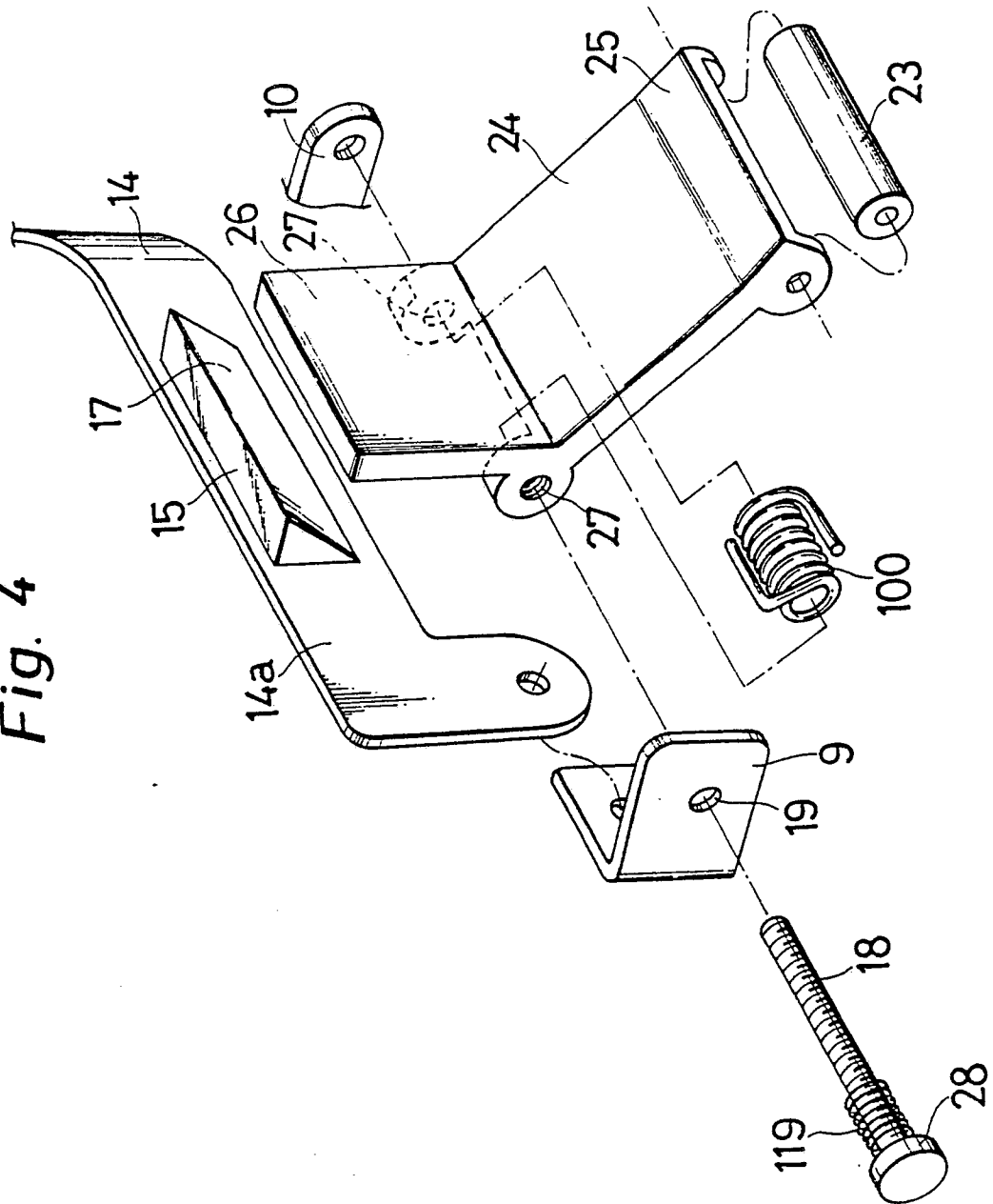


Fig. 5

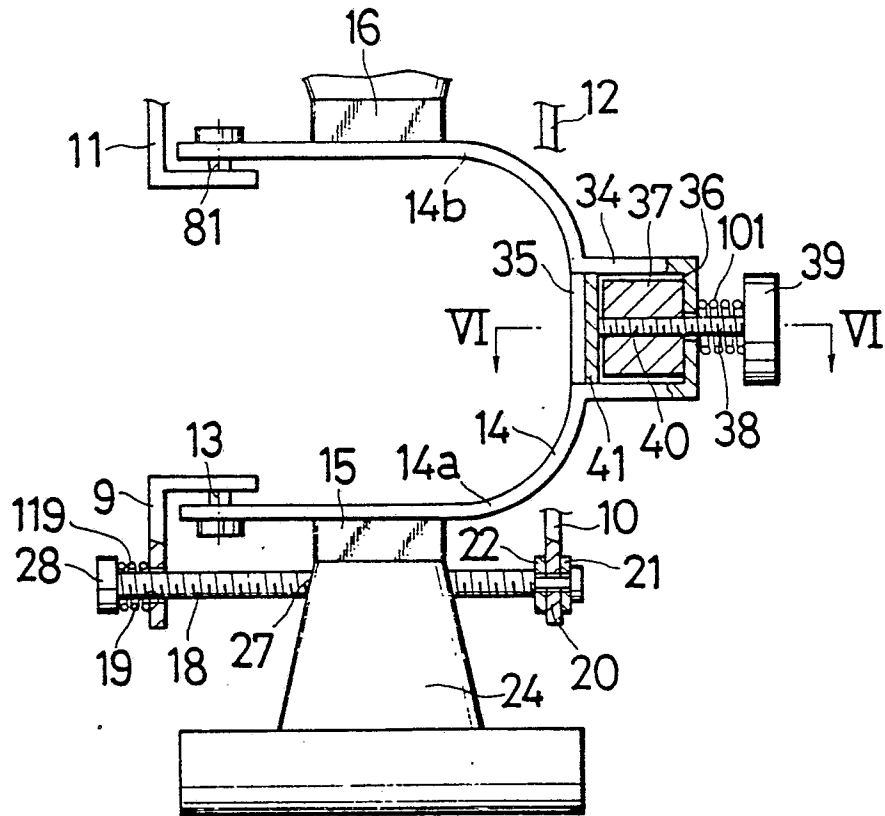


Fig. 7

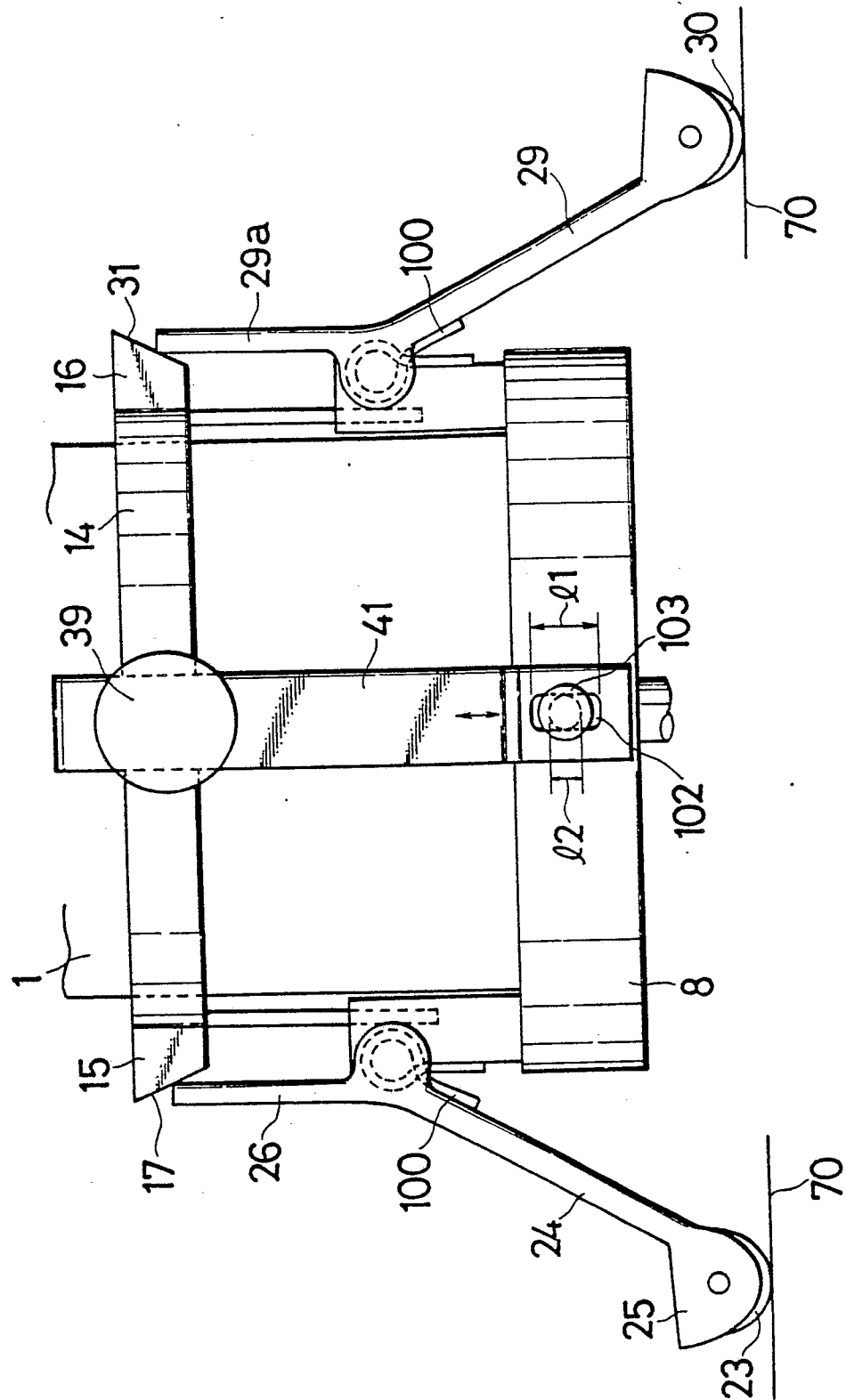


Fig. 8

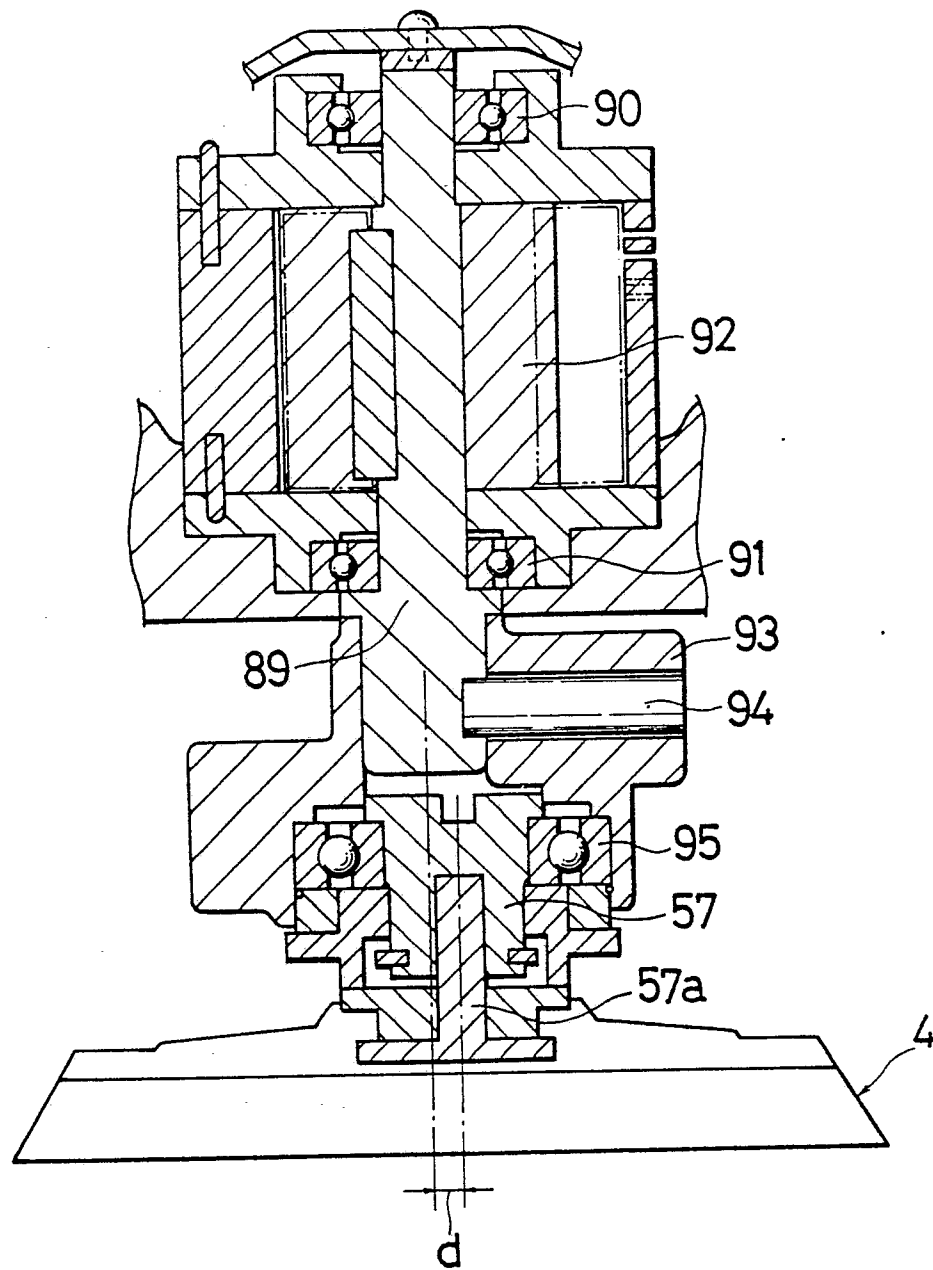


Fig. 9

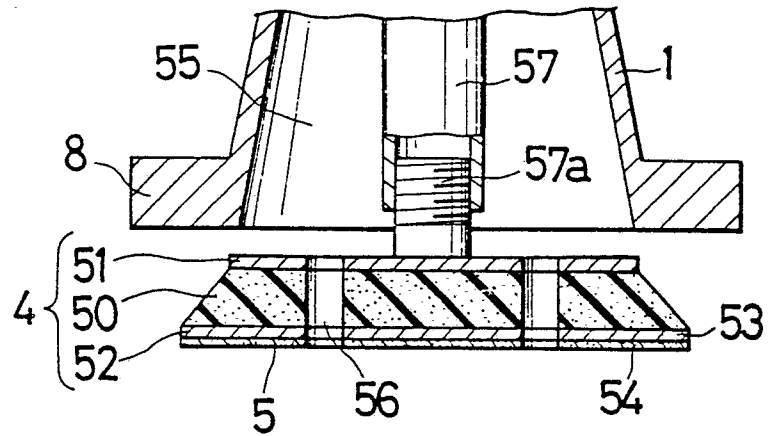


Fig. 10

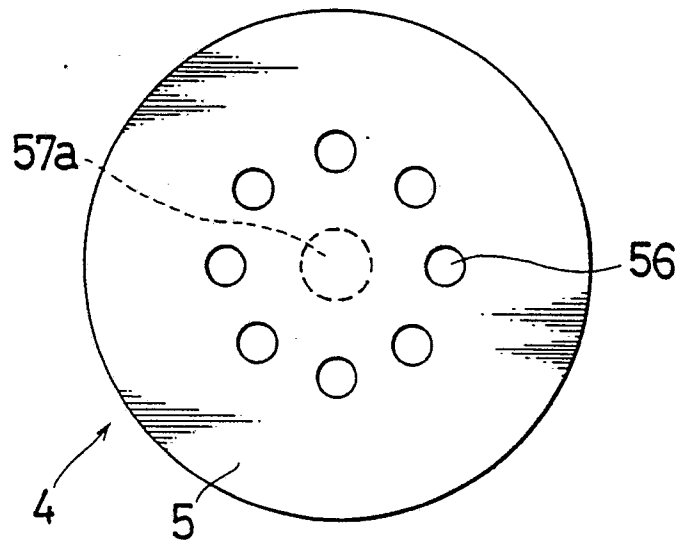


Fig. 11

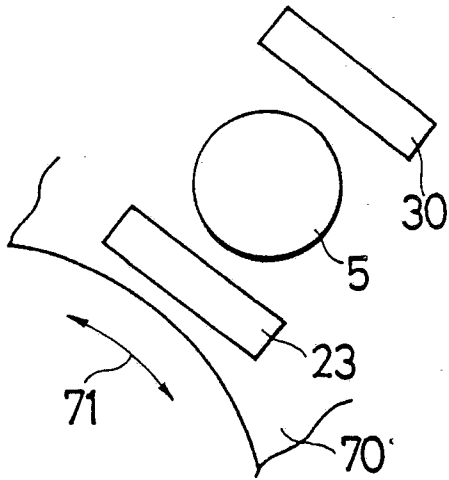


Fig. 12

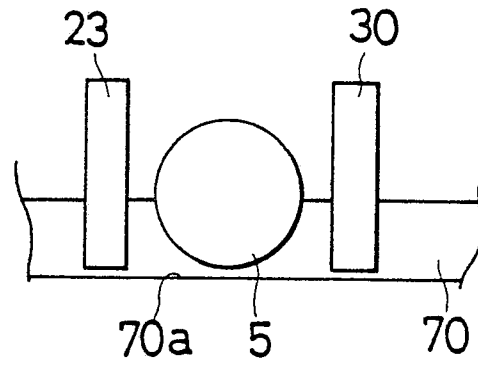


Fig. 13

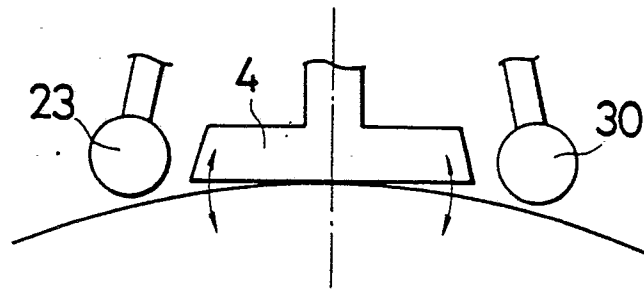


Fig. 14

