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

(11) EP 0 945 217 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
29.09.1999 Bulletin 1999/39

(51) Int. Cl.[6]: **B24B 9/16**

(21) Application number: **98105275.6**

(22) Date of filing: **24.03.1998**

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

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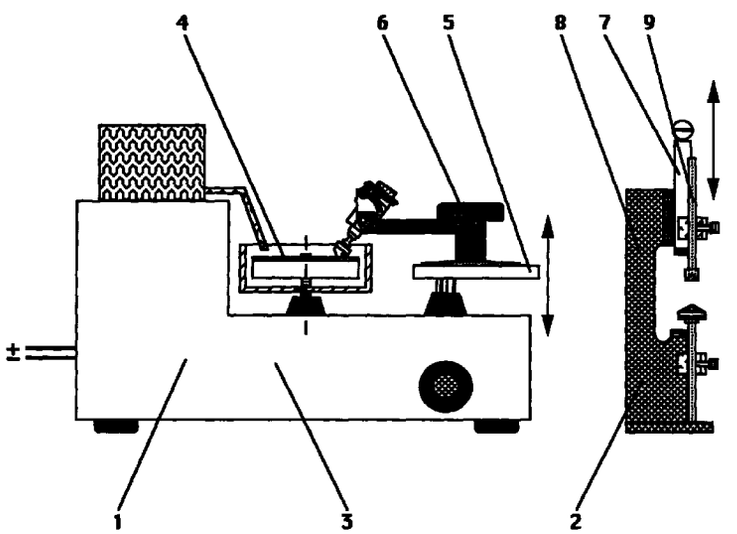
(54) Apparatus for faceting gems and the like

(57) An apparatus for faceting gems and the like comprises a faceting device and an instrument for aligning the gemstones on dop sticks; the faceting device (1) consists of a structure (3) holding at least a lap (4) and a plate (5) for bearing a mechanism (6) holding the dop stick (9a,9b); the instrument for aligning (2) the gemstones comprises a bracket (8) which holds a cursor (7); the cursor (7) is vertically moved and presents a vertical groove (31) which maintains a first dop stick (9b) vertical, while a second dop stick (9a) is maintained vertical by a flat surface (21) of the basis (20) of the aligning instrument (2); a vertical bearing groove (23) made in a wall (37) of the bracket (8) is provided for maintaining both dop sticks (9a,9b) aligned in any position reached by the cursor (7) during its displacement in order to transfer the properly oriented gemstone (24) from the first dop stick (9a) to the second dop stick (9b).

Fig.1



EP 0 945 217 A1

Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an apparatus for working precious stones, gems, semi-precious stones and the like; essentially, the apparatus comprising a device for faceting the stones and an instrument for aligning the stones.

STAND OF THE TECHNIQUE

[0002] US-A- 3,940,888 discloses a faceting device for gemstones. The device is used for properly orienting a gemstone for forming facets thereon in a plurality of coaxial rows with equal spacing of the facets in the rows. A dop stick is provided on the end of a faceting shaft secured in a quill sleeve rotatably mounted in a faceting head (which can be angularly adjusted for different facet rows to be formed). A spring-biased detent trigger is pivoted on the bracket to engage between the teeth of an indexing gear secured on a collar on the quill sleeve near the other end of the shaft. A positioning pin is secured to the collar and projects through the gear. A guide disc having evenly spaced peripheral notches is engaged around and can be rotated on a flanged bushing threadably engaged on the quill sleeve adjacent the gear, and a coil spring is provided on the bushing, urging the disc toward the gear. The disc has respective holes spaced to receive the pin to establish the angular relationship between the successive rows of evenly spaced facets. The notches on the disc guide the detent trigger into engagement between the gear teeth for assuring uniform angular rotational steps of the shaft in forming the facets of a particular row.

[0003] US-A- 4,263,753 relates to an interchangeable faceting apparatus with reversible dual indexing mechanism. The apparatus comprises a reversible dual indexing mechanism consisting of a primary indexing gear with a small number of notches and an auxiliary indexing gear controlling the primary gear, and a height adjusting mechanism which permits a faceter frame to be precisely positioned with respect to the lap surface at any height of the faceter frame. The primary indexing gear with a relatively small number of notches engaged by a spring trigger provide subdivided indexes by the action of the auxiliary indexing gear

[0004] In general, the apparatuses disclosed by the known documents consist of a device for faceting gemstones and an instrument for aligning the dop sticks; the device comprises a lap and a plate supporting a forked arm which holds the dop stick, while the aligning instrument consists of a bracket with two coplanar walls; the dop stick rests against the first wall for holding the gemstone of which a first faceting has taken place, the dop stick is disposed against the second wall for transferring the gemstone which must be faceted successively.

[0005] In these and other documents of prior art devices or faceting instruments are described which substantially present the following disadvantages:

A- The supporting plate is vertically moved by means of a worm screw which easily wears; therefore the plate loses its horizontal lying in the long run;

B- The faceting device presents three holding ends on the supporting plate; this configuration does not assure the parallelism between the supporting plate and the mechanism for holding the dop sticks because of the easy wear of the holding ends;

C- The alignment of the stone with respect to the faceting head is obtained without the use of a properly graduated reference device; therefore, even the alignment obtained by a very skilled person is anyhow not very precise;

D- The scale of the horizontal rotations of the dop sticks is found at the side of the axis of symmetry of the forked arm; therefore, it is read with difficulty and the devices controlling the displacement of the angular position are not very accessible and controllable.

AIM OF THE INVENTION

[0006] The purpose of this invention is to remedy these defects. The invention, as claimed, solves the problem of creating an apparatus for faceting gems and the like. The supporting plate of the apparatus according to the invention is vertically moved by means of a grooved shaft on which a pair of gears acts, the shaft being guided by a bushing having a groove which snugly contains the shaft; therefore, the supporting plate maintains its horizontal lying in the long run.

[0007] Essentially, the advantages due to the use of the invention consist in the fact that the device for faceting the stones presents a basis held by the supporting plate; the basis supports both the forked arm and the faceting head and allows their horizontal rotation by means of a pivot. This configuration assures the parallelism between the supporting plate and the faceting device since the basis does not wear; in addition, the alignment of the gemstone with respect to the lap is obtained by means of a precise graduated reference device in both horizontal and vertical directions, the reference device being fitted with respective delicate indexing devices easy to read; the devices controlling the displacement of the angular positions being easily accessible and controllable. An instrument for aligning the stone is provided for transferring the stone from a dop stick to another; the angular precision in the transferring is assured by two holes for the insertion of the pins integral with the dop sticks and by two grooves for bearing said dop sticks. The movable upper part (cur-

sor) assures precise prompt transferring manoeuvre.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Other advantages, features and aims of the invention may be more readily understood by referring to the accompanying drawings, which concern preferred embodiments, in which:

Fig.1 shows the apparatus with a faceting device and an instrument for aligning the stones;
Fig.2 is a lateral view of a first embodiment of the faceting device for gemstones;
Fig.3 is a plan view of the device of Fig.2;
Fig.4 is a plan view of a second embodiment of the faceting device for gemstones;
Fig.5 is a side view of an aligning instrument with a cursor in a first position;
Fig.6 is a side view of the aligning instrument with the cursor in a second position;
Fig.7 is a sectional view with the plane C-D of the guide of the cursor;
Fig.8 shows a first dop stick holding a gem;
Fig.9 is a side view of a second dop stick in which the gem has been transferred from the dop stick of Fig.8;
Fig.10 is a sectional view with the plane A-B of the supporting bracket of an aligning instrument with the dop stick in a first angular position;
Fig.11 is a sectional view with the plane A-B of the supporting bracket with the dop stick in a second angular position;
Fig.12 is a sectional view with the plane A-B of the supporting bracket with the dop stick in a third angular position;
Fig.13 is a plan view of a holding mechanism of the dop stick for faceting the gems;
Fig.14 a side view of the holding mechanism of Fig.13;
Fig.15 is a side view of the mechanism of Fig.13 with the raking faceting head and the gem supported by a lap;
Fig.16 is a side view of the faceting head;
Fig.17 is a plan view of the faceting head;
Fig.18 is a plan view of a detail of the faceting head;
Fig.19 is a front view of the detail of Fig.18; and
Fig.20 is a front view of the constructive detail of Fig.18 rotated by some grades.

DESCRIPTION OF PREFERRED EMBODIMENTS OF THE APPARATUS

[0009] The apparatus of Fig.1 comprises a device 1 for faceting the stones and an instrument 2 for their alignment. The faceting device 1 consists of a structure 3 holding a lap 4, a bearing plate 5 for a mechanism 6 holding the dop stick for the faceting; the instrument 2 presents a cursor 7 held by the upper part of a bracket 8, said cursor 7 holding a dop stick 9. The apparatuses of Fig.1 will be described more in detail with reference to following figures.

[0010] The faceting device 1 shown in Fig.2 consists, among other things, of the structure 3 which supports the lap 4; an electric motor (not shown) is provided inside the structure 3 to vary the angular speed and reverse the rotation direction of the lap 4, the electric motor is fed by two rheophores indicated by the respective polarities (+,-). The electric motor is mechanically connected to the lap 4 by means of a shaft 10.
A tank 11 contains water (or another liquid suitable for the purpose) which is sent to the upper surface of the lap 4 through a duct 12; the lap 4 is housed in a recipient 13 which is used for collecting and dripping the water.
A pair of gears (not shown) is capable of lifting and lowering the bearing plate 5; the gears inside the structure 3 are mechanically connected to the bearing plate 5 through a grooved shaft 14 and manoeuvred by means of a handwheel 15.
The grooved shaft 14 is guided by a bushing 57 presenting a groove snugly containing the shaft 14.
The bearing plate 5 is eccentric with respect to the axis of symmetry of the shaft 14 secured to the free end of the same shaft 14; therefore, the bearing plate 5 can only be vertically lifted and lowered.
The holding mechanism 6 presents a lower basis 16 directly bearing on the bearing plate 5, a handgrip 17 is used for rotating a faceting head 18.
Fig.3 shows a plan view of the same devices; the handgrip 17 is integral with a forked arm 19, the free end of which supports the faceting head 18; therefore, the rotation of the forked arm 19 takes place in the lying delimited by the forked arm 19 and in both opposite directions indicated by the arrows F_1, F_2.
Fig.4 represents a plan view of a second embodiment of the device for faceting gemstones; this device is substantially like the device shown in the previous figures, except for two laps 4a, 4b respectively housed in two recipients 13a, 13b, while two ducts 12a, 12b respectively bringing the water to the two laps 4a, 4b, come out of the tank 11; both laps 4a, 4b are rotated by two shafts 10a, 10b both being mechanically conncected to the electric motor placed inside the structure 3.
The gemstone held by the faceting head 18 is worked by the two laps 4a, 4b each presenting a different granulometry suitable for two subsequent faceting phases. Therefore, the forked arm 19 is rotated in two subsequent faceting positions 19a, 19b, while the faceting head 18 is displaced in correspondent positions 18a, 18b. If required, the laps 4a, 4b rotate at different angular speed.

[0011] The aligning instrument is shown in the Figs 5, 6; this instrument consists of a supporting basis 20 which defines a flat upper surface 21, the basis 20 being integral with a bracket 22 which develops vertically and presents a V-shaped vertical bearing groove 23 which is used as a support for a dop stick 9a the end 34a of

which holds a partially faceted stone 24; a pin 25a is provided for obtaining the exact verticality of the dop stick 9a, said pin 25a perpendicularly protruding from the side surface of the dop stick 9a; the pin 25a is inserted into a horizontal hole 36 pierced in the bracket 22 near the vertical bearing groove 23; when the lower end of the dop stick 9a rests on the flat surface 21 and the pin 25a is inserted in the hole 36, the dop stick 9a is made adhering to the bearing groove 23 through a screw 26 screwed in a plate 27 integral with the bracket 22. In this manner, the vertical positioning of the dop stick 9a is reached, so that it is enough to take the gemstone 24 from the dop stick 9a.

[0012] The upper part of the bracket 22 holds a cursor 28 which moves vertically in the guide 29 also shown in Fig.7; the cursor 28 presents a hole 30 for supporting a dop stick 9b where the gemstone 24 must be transferred; the hole 30 develops horizontally and the cursor 28 presents a V-shaped vertical bearing groove 31 on which the dop stick 9b rests; the inserting of the pin 25b of the dop stick 9b into said hole 30 and the adhering of the dop stick 9b to the groove 31 by means of a screw 32 screwed in a plate 33 integral with the cursor 28 guarantee the verticality of the dop stick 9b. The two dop sticks 9a, 9b are coaxial to each other owing to the structural configuration of the instrument and the alignment of the two grooves 23, 31.

[0013] The lowering of the cursor 28 brings the end 34b of the dop stick 9b into contact with the faceted part of the gemstone 24; an adhesive is used for maintaining the faceted part of the gemstone 24 secured to said end 34b.

[0014] Fig.7 shows in detail and in a different scale the section with the plane C-D of Figs 5, 6 of the bracket 22 for highlighting the V-shaped longitudinal groove 31, on which the dop stick 9b rests, and the guide 29; the groove 31 is located in the part of the cursor 28 housing the dop stick 9b.

[0015] Fig.8 represents a side view of the dop stick 9a fitted with the end 34a holding the gemstone 24, the pin 25a which must be inserted into the hole 36 of the bracket 22 and a threaded end 35a opposite to the end 34a.

[0016] Fig.9 shows a side view of the dop stick 9b, to the end 34b of which the gemstone 24 must be transferred, the pin 25b to be inserted into the hole 30 of the cursor 28 and a threaded end 35b opposite to the end 34b.

[0017] Figs 10, 11, 12 respectively show the dop stick 9a in three angular position for three different types of faceting working of the gemstone 24. In Fig.10 the pin 25a is inserted in the horizontal hole 36 made in the bracket 22 near the vertical bearing groove 23; the pin 25a of Fig.11 rests on the vertical wall 37 of the bracket 22 in which the groove 23 is defined; the pin 25a is found in a position perpendicular to the position of Fig.10; in Fig.12 the pin 25a rests on the vertical wall 37 of the bracket 22 and occupies a position rotated by 180° with respect to the position of Fig.11. In said positions the dop stick 9a adheres to the vertical bearing groove 23.

[0018] The holding mechanism of the dop stick for faceting gemstones shown in Figs 13, 14, 15 presents the handgrip 17 integral with the forked arm 19 holding the faceting head 18. The basis 16 integral with the mechanism rests on the bearing plate 5 of the faceting device 1; a precisely vertical pin 39 fastened to the basis 16 is used for rotating the handgrip 17 and the forked arm 19 around the vertical axis E; the directions of rotation are indicated by the arrows F_1, F_2.

[0019] A horizontal pivot 40 supports the faceting head 18 to allow rotation around the horizontal axis F in order to displace the faceting head 18 in various positions like those indicated in Figs 14, 15.

[0020] The rotation around the pin 39 occurs in a plane parallel to the lap 4 and the bearing plate 5; this rotation helps to give uniformity to the faceting of the various parts of the gemstone 24. The rotation around the pivot 40 helps to choose the faceting angles of the head 18 with respect to the lap 4; the directions of rotation being indicated by the arrows F_3, F_4.

[0021] The faceting head 18 is indicated in the Figs 16, 17 in another scale. The dop stick 9a holding the gemstone 24 is inserted in a bushing 41 and fastened by a nut 42 screwed on the threaded end 35a of the dop stick 9a; the cross and angular positions of the dop stick 9a with respect to the axis G of the faceting head 18 are defined by the pin 25a clamped by the V-shaped flaring 43 provided at a first end 44 of the bushing 41. The second end of the bushing 41 presents a bearing plane 45 for a ring nut 46 used as angular reference device for the faceting head 18 and the dop stick 9a, 9b; the ring nut 46 being clamped to the bushing 41 through a nut 47. A stop ring 55 secures the bushing 41 to the body 56 of the faceting head 18.

[0022] A first indexing sector 48 is mounted on the faceting head 18, the indexing sector 48 being fitted with a 0°-90° graduated scale for indicating the angular position of the faceting head 18 with respect to the plane of the lap 4 (Fig.15). A second indexing sector 49 (nonius) is provided opposite the first indexing sector 48 for defining the zero-point of the rotation and obtaining a tenth of degree precision in the directions of rotation F_3, F_4 (Fig.15). The stopping of the rotation in the chosen angular position is obtained by means of a knob 50.

[0023] The rotation around the axis G of the dop stick 9a is reached by rotating the bushing 41, while the angular position is indicated by the ring nut 46; the stopping of the rotation in the chosen angular position is reached by means of a tang 51 ending with a wedge 53 which engages the chosen notch of the ring nut 46. A reference notch is provided at the second end of the tang 51 for defining the zero-point of the rotation and obtaining a tenth of degree precision in the horizontal direction by means of an indexing plate 52.

[0024] Fig.18 shows a plan view of a constructive

detail of the faceting head 18 also indicating the position of the section E-F for defining the Figs 19, 20.

[0025] The wedge 53 of the tang 51 may be clamped by the sheet 54 for allowing free rotation of the bushing 41 (Fig.19) or engaged by the ring nut 46 (Fig.20) for the stopping in the chosen angular position.

Claims

1. Apparatus for faceting gems and the like comprising a faceting device and an instrument for aligning the gemstones on dop sticks, characterised by the fact that the faceting device (1) consists of a structure (3) holding at least a lap (4) and a bearing plate (5) for bearing a mechanism (6) holding the dop stick (9a,9b); a pair of gears is provided capable of lifting and lowering the bearing plate (5); the gears are located inside the structure (3), being mechanically connected to the bearing plate (5) through a grooved shaft (14) and manoeuvred by means of a handwheel (15); the instrument for aligning (2) the gemstones comprises a bracket (8) which holds a cursor (7); the cursor (7) is vertically moved and presents a V-shaped vertical bearing groove (31) which, together with a hole (30) perpendicular to the groove (31), maintains a first dop stick (9b) vertical, while a second dop stick (9a) is maintained vertical by a flat surface (21) of the basis (20) of the aligning instrument (2), a V-shaped vertical bearing groove (23) made in a wall (37) of the bracket (8) and by a hole (36) perpendicular to the groove (23), so that both dop sticks (9a,9b) are found aligned in any position reached by the cursor (7) during its displacement in order to transfer the properly oriented gemstone (24) from the first dop stick (9a) to the second dop stick (9b).

2. Apparatus as in claim 1, wherein the plate (5) bearing the mechanism (6) holding the dop stick (9a,9b) is mechanically connected to a grooved shaft (14) on which a pair of gears acts, the grooved shaft (14) is guided by a bushing (57) having a groove snugly containing the shaft (14) so that the bearing plate (5) can maintain its horizontal lying in the long run.

3. Apparatus as in claim 1, wherein the mechanism (6) holding the dop stick (9a) presents a basis (16) which directly rests on the bearing plate (5) of the faceting device (1).

4. Apparatus as in claim 1, wherein the mechanism (6) holding the dop stick (9a) comprises a handgrip (17) integral with a forked arm (19) supporting a faceting head (18); a vertical pin (39) secured to the basis (16) is used for rotating the handgrip (17) and the forked arm (19) around the vertical axis (E) in the directions of rotation (F_1,F_2).

5. Apparatus as in claim 1, wherein a horizontal pivot (40) supports the faceting head (18) to allow rotation around the horizontal axis (F) of the faceting head (18) and obtain the different angular positions for working the gemstone (24); the rotation taking place in the directions (F_3,F_4) around the pivot (40).

6. Apparatus as in claim 5, wherein the faceting head (18) bears a first indexing device (48) fitted with a 0°-90° graduated scale for indicating the angular position of the faceting head (18) with respect to the plane of the lap (4); a second indexing device (49) is provided opposite the first indexing device (48) for defining the zero-point of the rotation and obtaining a tenth of degree precision in the directions of rotation (F_3,F_4); the stopping of the rotation in the chosen angular position being obtained by means of a knob (50).

7. Apparatus as in claim 1, wherein the faceting head (18) contains the dop stick (9a) inserted into a bushing (41), the dop stick (9a) holding the gemstone (24); the dop stick (9a) being fastened by a nut (42) screwed on the threaded end (35a) of the dop stick (9a); the cross and angular positions of the dop stick (9a) with respect to the axis (G) of the faceting head (18) are defined by the pin (25a) clamped by the V-shaped flaring (43) provided at a first end (44) of the bushing (41), while the second end of the bushing (41) presents a bearing plate (45) for a ring nut (46) used as an angular reference device for the faceting head (18) and the dop stick (9a,9b), the ring nut (46) being made integral with the bushing (41) through a nut (47); a stop ring (55) clamping the bushing (41) to the body (56) of the faceting head (18).

8. Apparatus as in claim 7, wherein the rotation around the axis (G) of the dop stick (9a) is reached by rotating the bushing (41), while the angular position is indicated by the ring nut (46); the stopping of the rotation in the chosen angular position being obtained by means of a tang (51) ending with a wedge (53) which engages the chosen notch of the ring nut (46); a reference notch is provided at the second end of the tang (51) for defining the zero-point of the rotation and obtaining a tenth of degree precision in the horizontal direction by means of an indexing plate (52).

9. Apparatus as in claim 1, wherein the device (1) for faceting the gemstones comprises two laps (4a,4b) presenting a different granulometry suitable for two subsequent faceting phases; the forked arm (19) is rotated in two subsequent faceting positions (19a,19b), while the faceting head (18) is displaced in correspondent positions (18a,18b); if required, the laps (4a,4b) rotate at different angular speed.

10. Apparatus as in claim 1, wherein the aligning instrument (2) consists of a supporting basis (20) which defines an upper flat surface (21); the basis (20) holds a bracket (22) fitted with a V-shaped vertical bearing groove (23) on which a first dop stick (9a) bears, the end (34a) of the first dop stick (9a) supporting a partially faceted stone (24); a pin (25a) perpendicularly protrudes from the side surface of the dop stick (9a), the pin (25a) is capable of being inserted into a horizontal hole (36) pierced in the bracket (22) near the vertical bearing groove (23); the upper part of the bracket (22) holds a cursor (28) which moves vertically in the guide (29), the cursor (28) presenting a hole (30) for supporting a dop stick (9b) where the gemstone (24) must be transferred; the hole (30) develops vertically and the cursor (28) presents a V-shaped vertical bearing groove (31) on which the dop stick (9b) rests; the lowering of the cursor (28) brings the end (34b) of the second dop stick (9b) into contact with the faceted part of the gemstone (24); an adhesive is used for maintaining the faceted part of the gemstone (24) secured to said end (34b).

Fig.1

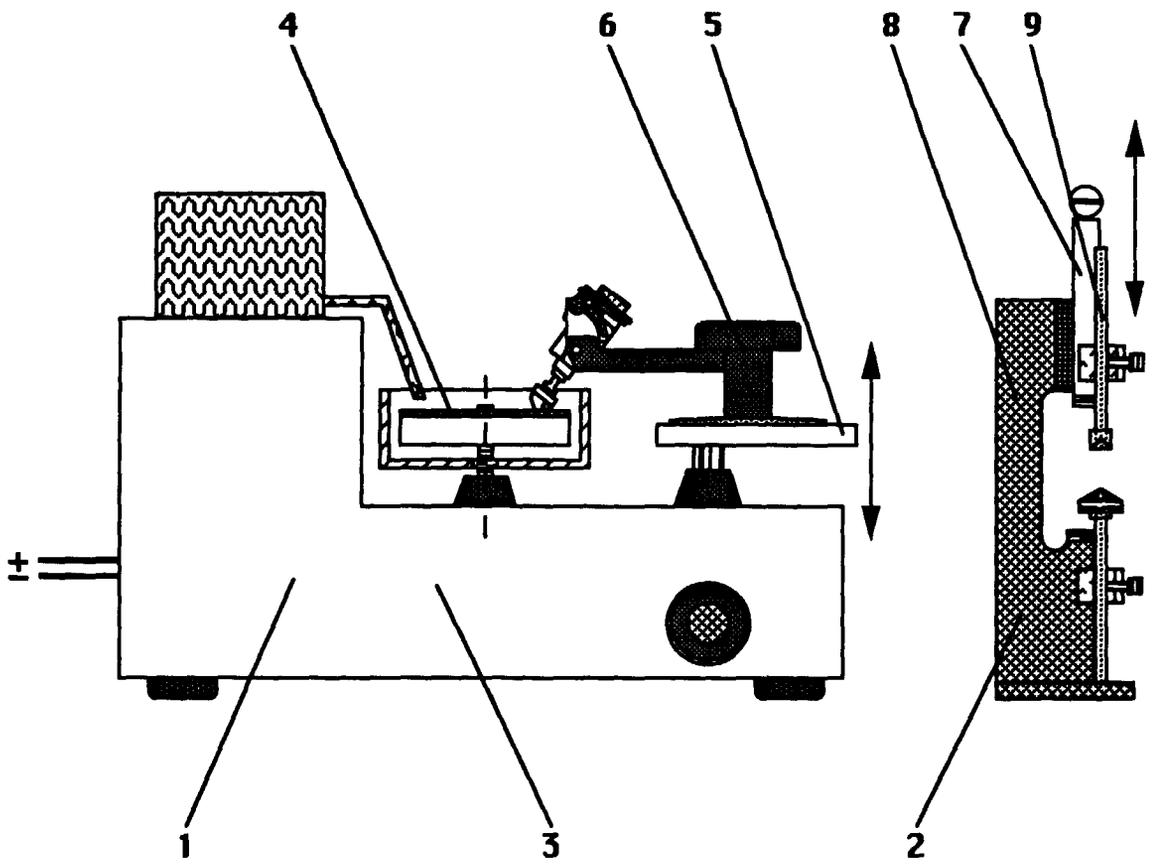
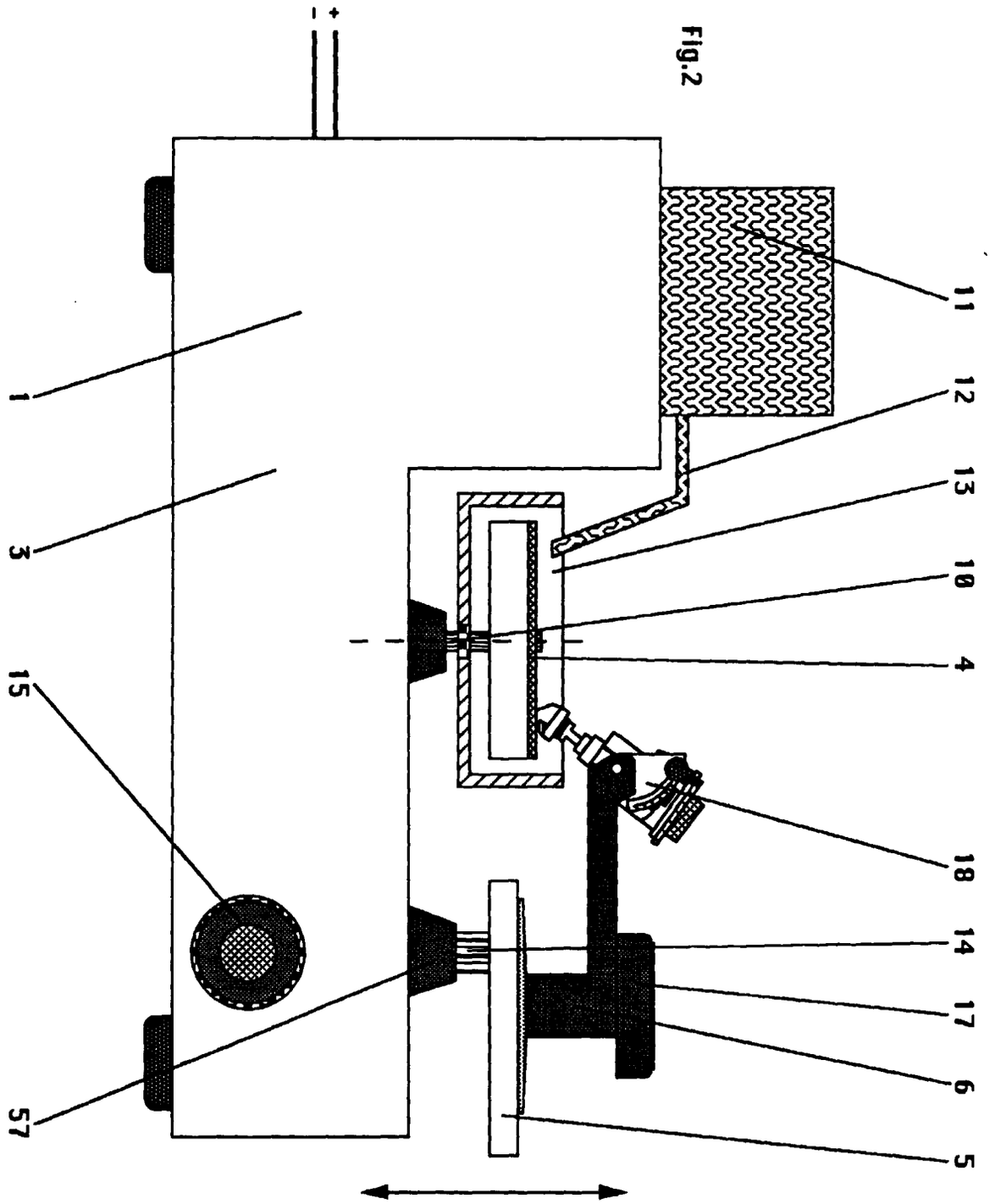


Fig.2



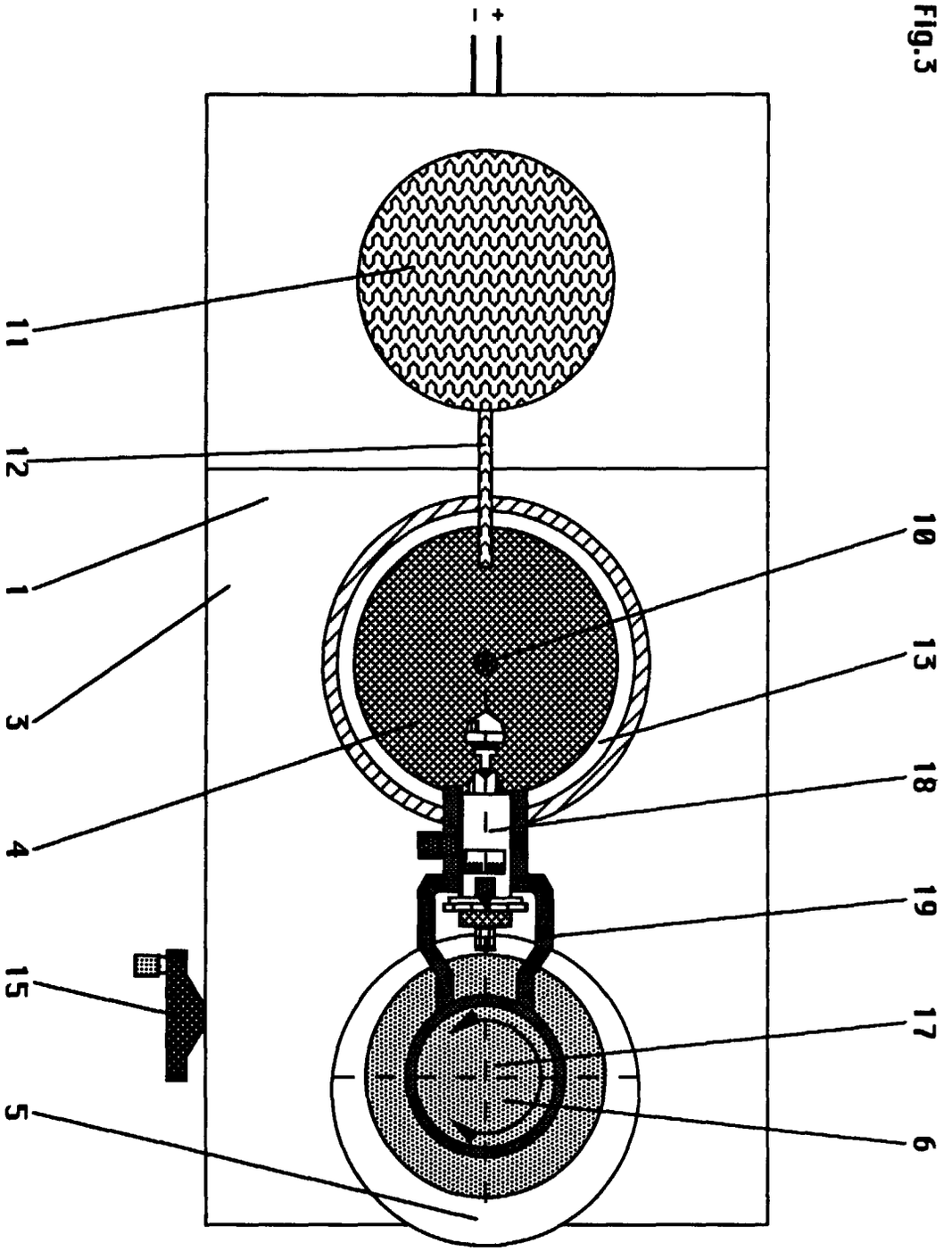


Fig.3

Fig.4

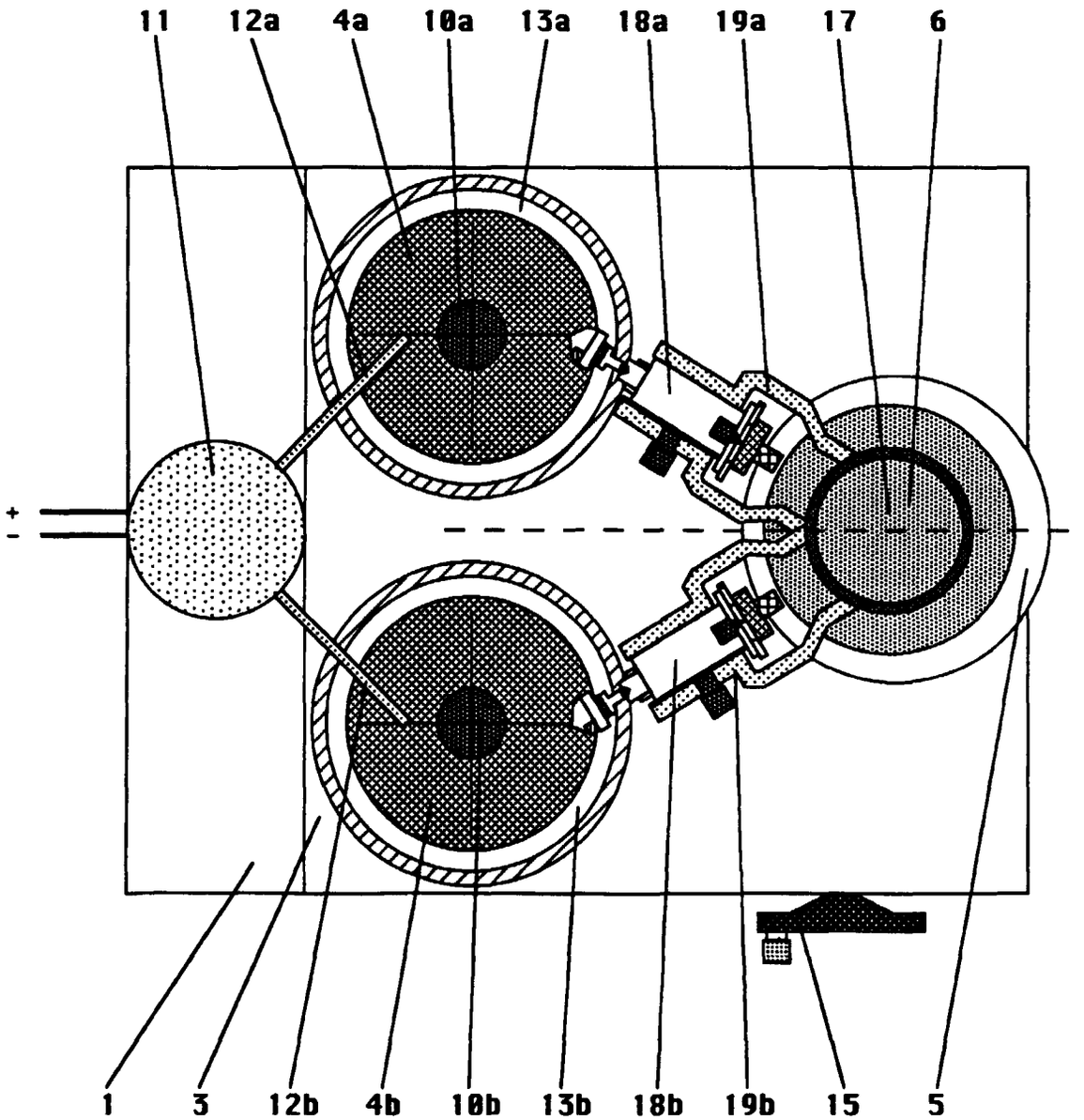
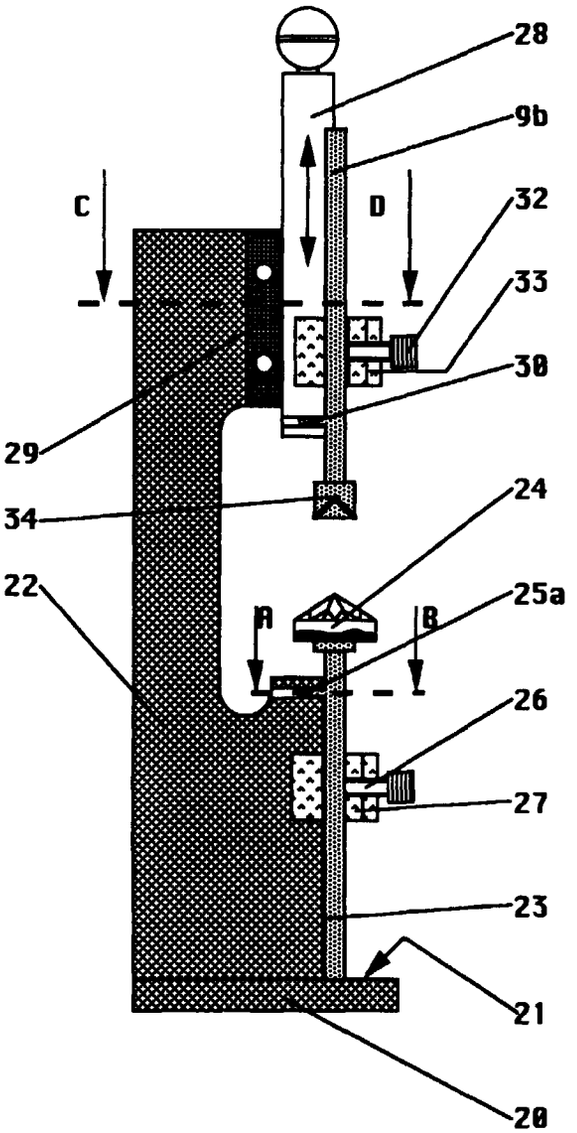


Fig.5


28
9b
C
D
32
33
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29
34
24
22
A
B
25a
26
27
23
21
20

Fig.6

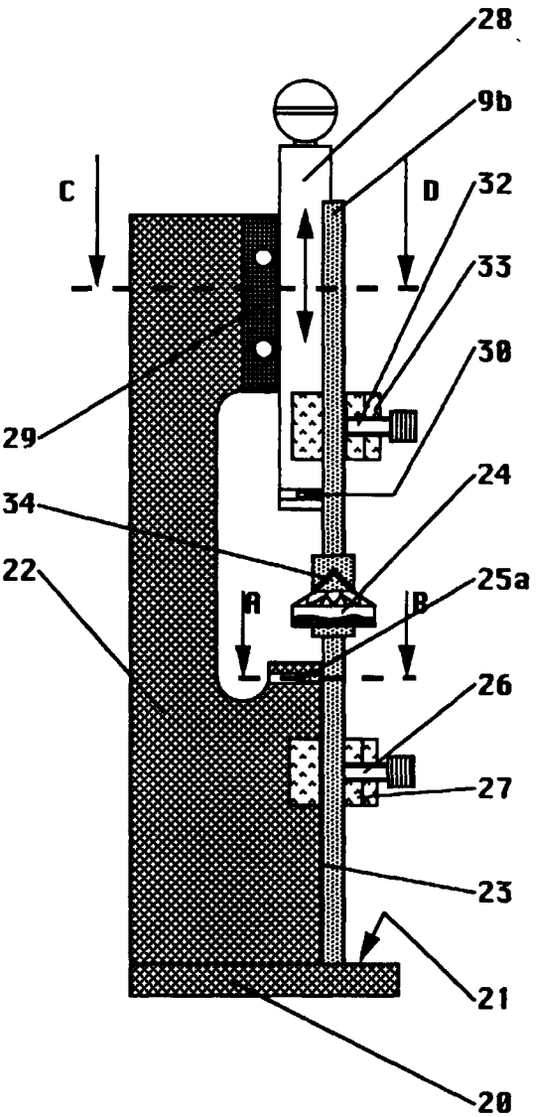
28
9b
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Fig.7

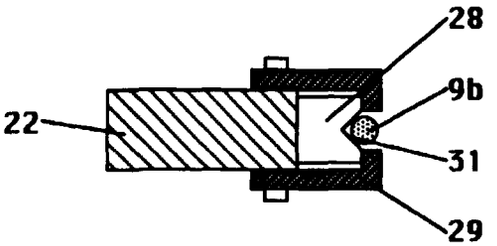


Fig.8

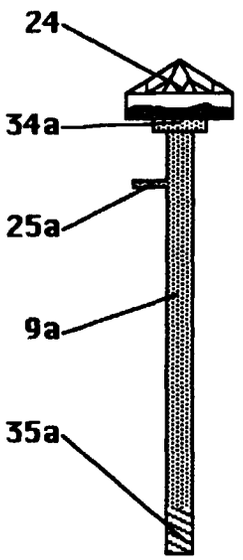


Fig.9

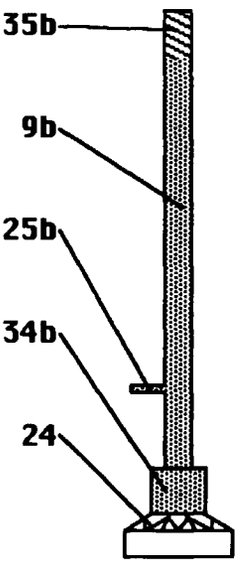


Fig.10

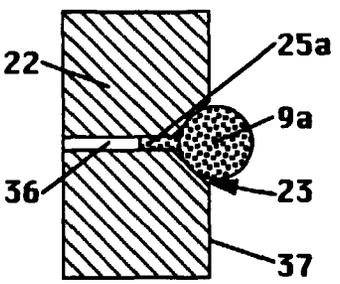


Fig.11

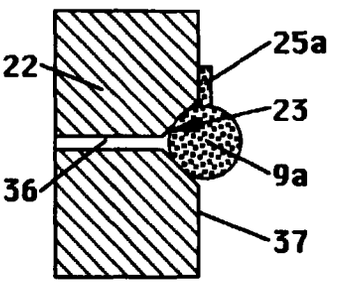


Fig.12

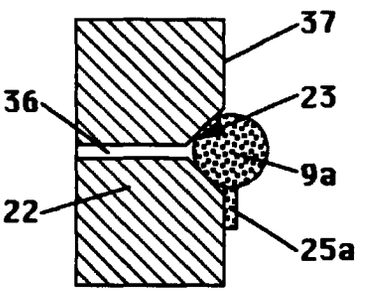


Fig.13

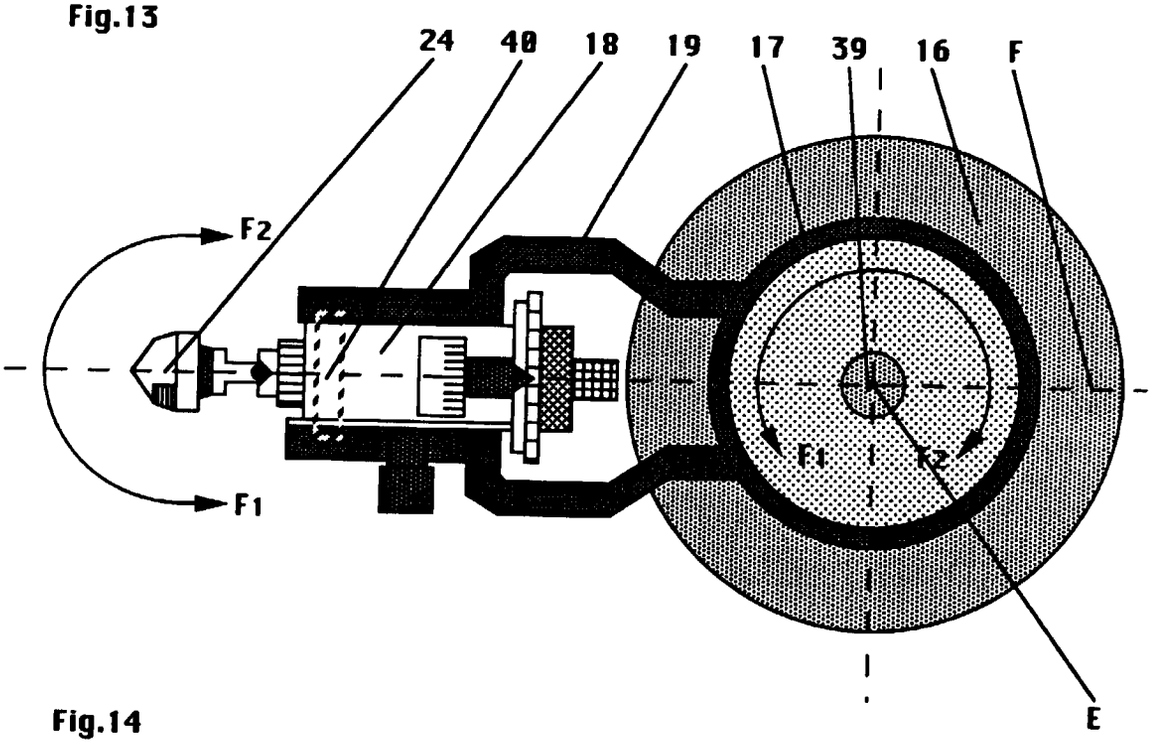


Fig.14

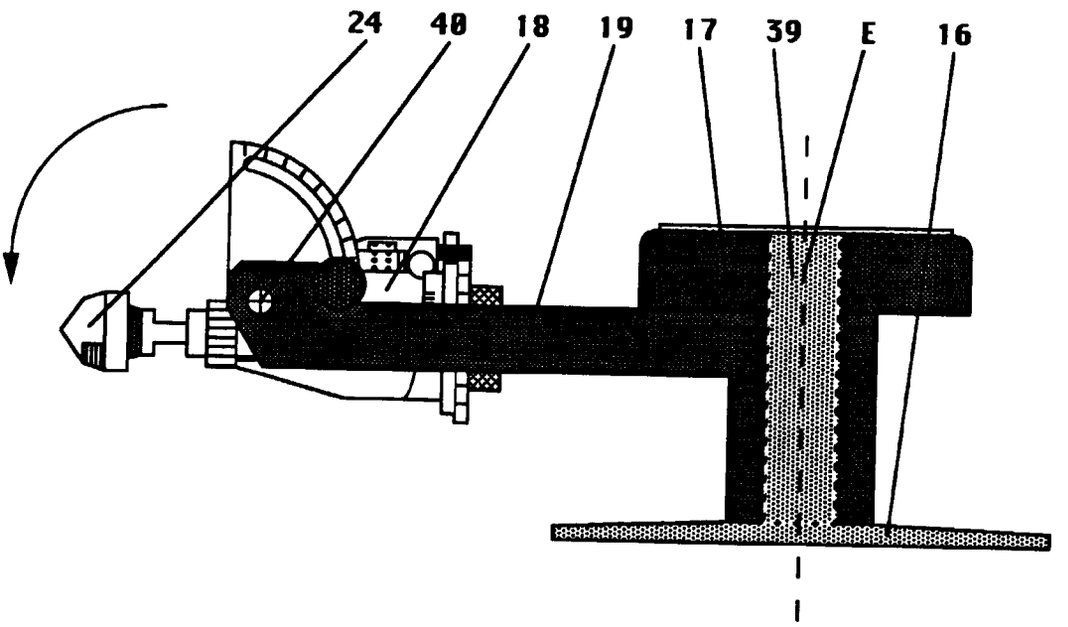


Fig.15

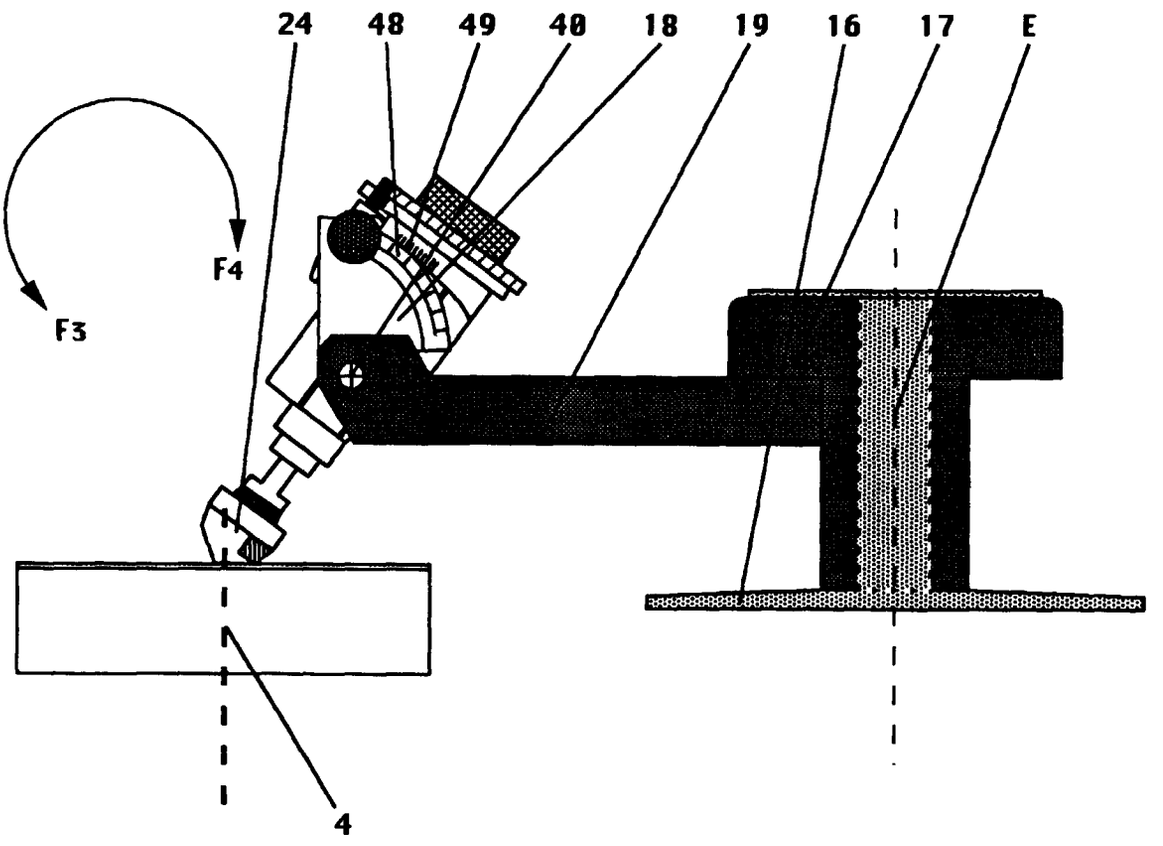
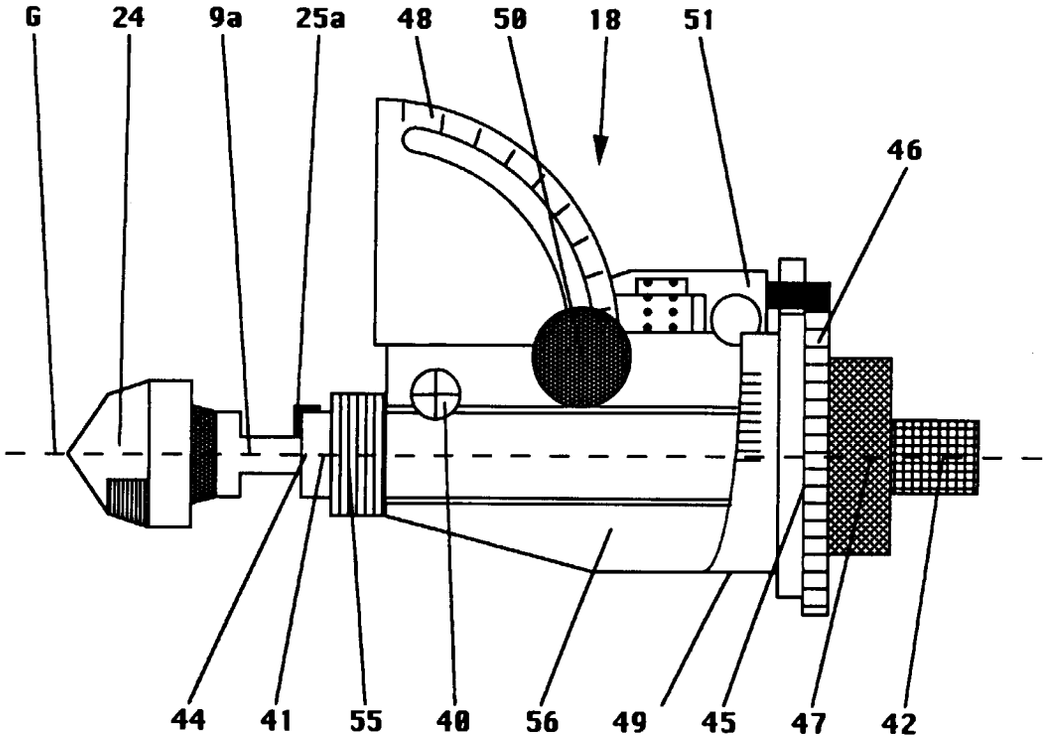


Fig.16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25a
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Fig.17

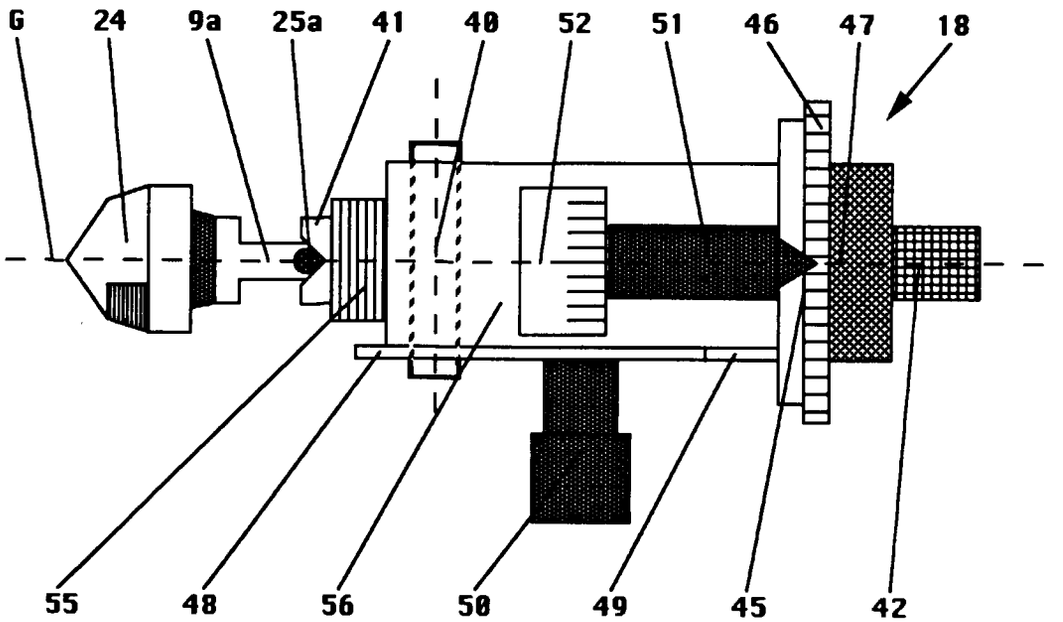
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Fig.18

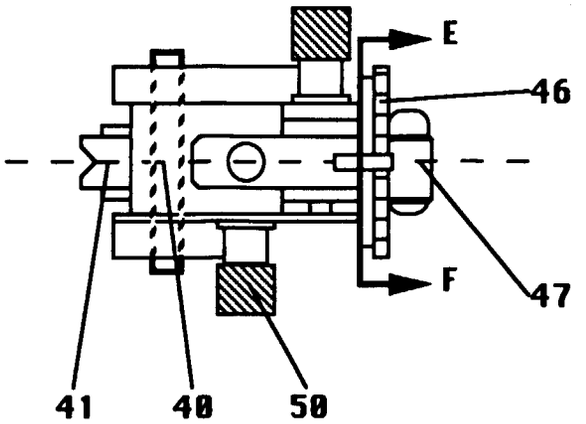


Fig.19

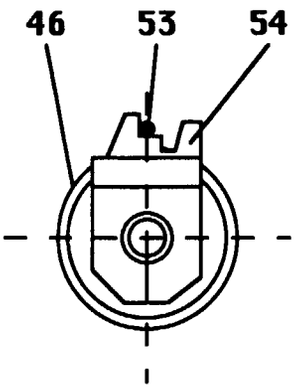
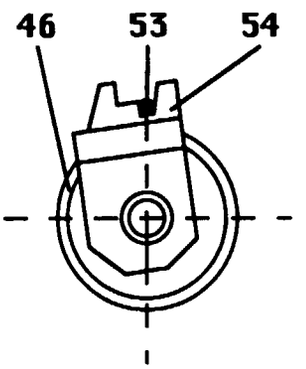


Fig.20



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EUROPEAN SEARCH REPORT

Application Number
EP 98 10 5275

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	US 4 106 240 A (DE BARTOLO PAUL I) 15 August 1978 * column 2, line 29 - line 55; figures *	1-3,5,7	B24B9/16
A	US 2 724 220 A (L.E. SHAW) 22 November 1955 * column 6, line 55 - column 7, line 24; figures 17-19 *	1,10	
A	US 3 815 289 A (HOFFMAN D) 11 June 1974		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B24B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 July 1998	Eschbach, D

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