



(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

12.05.2004 Bulletin 2004/20

(51) Int Cl.7: B28D 1/18, B28D 1/08

(21) Application number: 03025155.7

(22) Date of filing: 03.11.2003

(84) Designated Contracting States:

AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT RO SE SI SK TR

Designated Extension States:

AL LT LV MK

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(30) Priority: 07.11.2002 IT to20020957

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(54) Tool for carrying out recessed seats for electric devices and the like in a wall

(57) The implement comprises a motorised tool constituted by a continuous track (42) provided with cutting members (54), said track being guided in order to follow a run having two overlapped parallel horizontal branches (56, 58), joined by two curved opposed return sections at 180°, a front return section (60) of which is an

active section able to engage the wall (W) thereby removing the material so as to form therein a seat (S) having a squared cross-section which presents a width corresponding to the width of the track (42) and an height corresponding to the distance between the external faces of the two branches (56, 58) of the track.

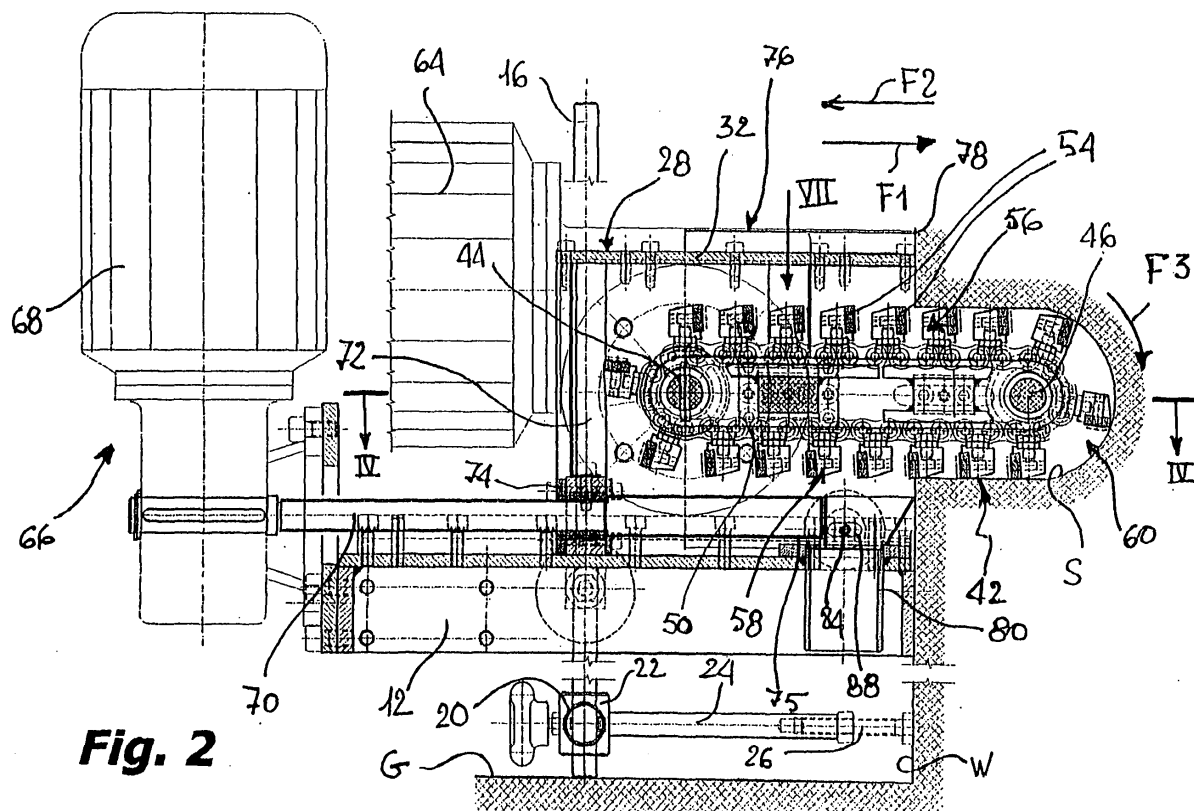


Fig. 2

Description

[0001] The present invention refers to a tool for carrying out recessed seats for electric devices and the like in a wall according to the preamble of claim 1.

[0002] The tool according to the invention has been conceived in its application for carrying out recessed seats for electric devices, like outlets and switches, in the walls of building skeletons, but it is not limited to this application. Therefore, it can be used for carrying out recesses or seats in a wall for housing various apparatuses, like for instance taps.

[0003] In the field of the electric devices, for enclosing an outlet, a switch or other in a wall, a seat is realised in the wall, said seat having such a size to be able to house a small box, usually made of plastic material, wherein the electric device is then inserted and fixed.

[0004] Until some time ago, the small boxes at issue had the shape of a circular cup and, for realising their seats, face milling cutters were used which made a circular cut in the wall. After having carried out said cut, the material located inside the circular cut was removed by means of a chisel.

[0005] More recently, small boxes having the shape of small square tubs for housing a single device, and having the shape of small rectangular tubs for housing two or more electric devices arranged side by side or overlapped, have come into usage.

[0006] In order to get a squared (square or rectangular) seat in a wall done to a fine art, resort is made to a portable electric disk saw by which the four sides of the seat are cut, and thereafter the material contained within the periphery defined by the four cuts is removed with a chisel.

[0007] This work is rather long and its precision, in particular as far as the squared shape of its seat is concerned, is not assured since it is entrusted to the operator's skill.

[0008] The object of the present invention is that of realising a tool of the considered type which allows to carry out recessed seats having a squared shape for electric devices and the like in a wall rapidly and with great precision.

[0009] According to the invention, this object is obtained by means of a tool as claimed.

[0010] A tool according to the invention allows an operator to carry out rapidly in a wall a perfectly squared seat having clean-cut edges, the size of the seat being determined by the width of the track and by the distance between the external faces of its two branches simply by making the track advance into the wall up to the depth needed for housing the small box or other.

[0011] The width of the track can correspond to the width of its seat for a single electric device. In this case, for forming a seat having a width corresponding to two or more devices arranged side by side or having an height corresponding to two or more overlapped devices, one carries out as many consecutive side by side or

overlapped seats as many devices are provided.

[0012] It is also possible to realise a tool provided with a track so dimensioned to carry out with a single pass rectangular seats dimensioned to house two or more electric devices arranged side by side or overlapped.

[0013] In the whole present description it is meant by track a ring-closed ribbon-like element which may be constituted either by a sequence of elements hinged between them or by a continuous belt made of flexible material.

[0014] Further characteristics and advantages of the invention will arise when reading the following detailed description of a preferred embodiment of the invention, made with reference to the hereby attached drawings provided as a non-limiting example and wherein:

- Figure 1 is a perspective view of the tool;
- Figure 2 is a median section of the tool carried out in greater scale in the longitudinal vertical plane II-II of Figure 1, with the track in an advanced position when the execution of a squared seat in a wall has been ended;
- Figure 3 is a similar median section, with the track in a rest back position;
- Figure 4 is a top plan, partially in section view in the horizontal plane indicated with IV-IV in Figure 2;
- Figure 5 is a front, partially in section view in the transversal plane indicated with V-V in Figure 4;
- Figure 6 is a cross-section carried out in the plane indicated with VI-VI in Figure 4; and
- Figure 7 is a plan view of the tool's track, according to the arrow VII of Figure 2, in a partially developed condition.

[0015] In Figure 1 a tool for carrying out recessed seats in a wall W is indicated in the whole with 10.

[0016] With reference to the Figures 1 to 7, the tool 10 comprises a base plate 12 which is supported by a frame resting on the ground and indicated as a whole in Figure 1 with 14.

[0017] The frame 14 comprises a pair of tubular up-rights 16 to which the base plate 12 is fixed in order to be adjustable in height by means of clamps 18.

[0018] In a region contiguous to the ground G, the two uprights 16 are interconnected by a tubular crosspiece 20, likewise fixed to the uprights by means of clamps 22 shaped like prismatic blocks and allowing to make said crosspiece adjustable in height.

[0019] Respective horizontal props 24 depart from the clamps 22, said props 24 ending with respective screw jacks 26 that, when using the tool, contrast against the lower part of the wall W in which it is wished to carry out a recessed seat S (Figures 2 and 4).

[0020] The assembling system of the frame 14 by means of the clamps 18 and 22 allows to disassemble said frame into the single tubular elements 16 and 24, which may be grouped together in a bundle for transport convenience.

[0021] A box-shaped slide, indicated as a whole with 28, is slidably mounted on the base plate 12.

[0022] In particular, the slide 28 is essentially composed by a pair of opposed side walls 30 and by an upper wall 32.

[0023] A respective strip 34 (Figures 5 and 6), which slidably rests on the upper face of the base plate 12, is fixed at the base of each side wall 30.

[0024] The strips 34 are held and guided by means of respective gibs 36 having a squared profile, said gibs being fixed to the plate 12 and extending over all their length along the two side edges of the plate.

[0025] Respective flanks 40 are rigidly fixed, with the interposition of spacing keys 38 (Figures 4 and 6), to the two side walls 30 of the slide 28 and inside it. The flanks 40 constitute a frame for a cutting tool in the form of a track that is indicated as a whole with 42 and the particulars of which will be specified in the following.

[0026] The two flanks 40 support, by means of bearings, a pair of opposed lay shafts 44, 46, that support in turn respective rolling members in the form of sprocket wheels 48 (Figures 5 to 7).

[0027] The track 42 is provided with two parallel continuous chains 50 (Figures 2 and 3) meshing with the sprocket wheels 48.

[0028] Preferably, as it is more clearly shown in Figure 7, the track 42 proper is constituted by a sequence of transversal splines 52 that are fixed to the two chains 50.

[0029] Preferably as well, each spline 52 bears a respective cutting member 54 that is staggered with respect to that of the preceding spline 52.

[0030] Advantageously, each cutting member 54 is constituted by a plate made of hard metal, preferably a metallic carbide, like Widia®.

[0031] The track 42 is guided by the sprocket wheels 48 in order to follow, in the condition of use, a run having two overlapped parallel horizontal branches, an upper branch 56 and a lower branch 58, joined by two curved opposed return sections at 180° (Figures 2 and 3). A front return section 60 thereof is an active section able to engage the wall W (Figure 2 and 4), thereby removing the material in order to dig therein a seat S (Figures 2 and 4) having a squared cross-section that presents a width corresponding to the width of the track 42 and an height corresponding to the distance between the external faces of the two branches 56, 58 of the track itself.

[0032] The shaft 44, corresponding to the return section opposed to the active section 60, is motorised for imparting a circulation movement to the track 42 by means of a motor reducer 62 that is fixed to the slide 28 and the electric motor of which, having preferably a variable speed, is indicated with 64.

[0033] In turn, the slide 28 is motorised for imparting an advance movement to the track 42 according to the arrow F1 of the Figures 1, 2 and 3, during the execution of the seat S, and a back movement according to the arrow F2 of the Figures 2 and 3, after having executed the seat S.

[0034] For imparting to the slide 28 the advance movements according to the arrow F1 and the back movements according to the arrow F2, it is provided a motor reducer 66, that is fixed to the base plate 12, with a reversible electric motor 68 having preferably a variable speed.

[0035] A translation screw 70 is coupled with the outlet shaft of the motor reducer 66.

[0036] Alternatively, in a simplified version of the tool according to the invention, for imparting to the slide 28 the advance movements according to the arrow F1 and the back movements according to the arrow F2, it is provided a manual control comprising a crank, that may be rotated by the operator when using the tool, in place of the electric motor 68 and of the motor reducer 66.

[0037] The end of the slide 28 turned towards the motor reducer 66 is closed by a flange 72 in the centre of which it is fixed a nut screw 74 meshing with the translation screw 70.

[0038] Preferably, the flange 72 bears, inside the slide 28 and below the track 42, an embossed case 75 (Figures 2 and 3) receiving the translation screw 70 for protecting it from the material removed from the wall W during the execution of the seat S.

[0039] Preferably, a box-shaped guard 76 is fixed to the base plate 12, said guard 76 surrounding the slide 28 and the track 42 and presenting a front edge 78 which defines a face against the wall W.

[0040] The front edge can be advantageously provided with a relatively soft gasket (not shown), made of rubber or of plastic material, for assuring that the surface of the wall W is not damaged.

[0041] When using the tool 10, the face defined by the edge 78 constitutes a reference with respect to which the movement of the slide according to the arrows F1, F2 of Figures 2 and 4 is perpendicular.

[0042] Preferably, below the track 42 and in a region contiguous to the front edge 78 of the guard 76, the base plate 32 bears a suction mouth 80 for the removed material (Figures 2, 3 and 6), which may be connected with a suction apparatus by means of a pipe H (Figure 1).

[0043] The track 42 is motorised so as to circulate in such a way (arrow F3, Figures 1 and 2) that the cutting members 54 remove the material of the wall W down from above, in order to make it fall directly into the mouth 80.

[0044] Preferably, as shown in Figure 1, control handles 82 (omitted in the other Figures) are fixed on the two sides of the base plate 12.

[0045] Advantageously, the handles 82 are provided with keys allowing the operator both to control the circulation of the track 42 and if necessary to adjust its speed, and to control the advancement of the track 42 and its moving backward.

[0046] With reference to Figure 1, for using the tool 10, first of all the operator adjusts the height of the track 42 with respect to the ground, by arranging said tool beforehand for carrying out for instance a seat for an outlet

near the floor of for a switch at a classical height of about 1 metre.

[0047] Then, by pushing on the handles 82 with his hands, the operator pushes the edge 78 of the guard 76 against the wall W.

[0048] If the edge 78 does not match exactly with the wall W (for instance if the wall W is not perfectly parallel to a plumb line), the operator adjusts the screw jacks 26 until he obtains the matching, thereby assuring the verticality of the movement of the track 42 according to the arrows F1, F2 with respect to the wall W.

[0049] The cutting work of the seat S of the Figures 2 and 4 begins with the track 42 in the retracted position of Figure 3 and with the edge 78 of the guard 76 correctly applied against the wall W.

[0050] Once this condition has been realised, the operator, by pushing the suitable push-buttons on the handles 82, first starts the motor 64 for making the track 42 circulate according to the arrow F3 of Figures 1 and 2 and then, by exercising a force on the handles 82 with his hands towards the wall W and, if necessary, on the crosspiece 20 with his foot, starts the motor 64 in the direction F1 of penetration of the track 42 in the wall (Figures 1 and 2). Then the track 42 advances into the wall W and the plates 54 progressively remove the material thereof by proceeding transversally in a cyclic way (from left to right in Figure 7) until the required depth for the seat S is reached.

[0051] Preferably, the two plates indicated with 54a and 54b in Figure 7, that are positioned at the side ends of the respective splines 52, slightly project from said ends for removing the material of the wall W so that the side edges of the other splines 52 do not slip on the sides of the seat S during the execution.

[0052] The desired depth for the seat S is determined by the collision of the front edge of the slide 28 with the wall W and can be adjusted by making the guard 76 and the slide 78 slide backwards and forwards the one with respect to the other, as it is shown in Figures 2 and 3. To this purpose, clamping screws 84 are associated with the guard 76, said clamping screws 84 being provided with handles 86 and being able to slide backwards and forwards into respective slots 88 (Figures 2 and 3) made in the side walls 30 of the slide 28.

[0053] When the desired depth has been reached, the operator stops the two motors 64 and 68 and then, preferably, reverses the movement of the reversible motor 68, thereby making the slide 28 go back and extracting the track 42 from the completed seat S, while the edge 78 of the guard 76 is kept applied against the wall W.

[0054] The extraction of the track 42 made in this way assures that the mouth of the seat S is not chipped, as it could happen instead if the operator would extract the track 42 by force of arms while the track 42 is completely advanced.

[0055] Although a preferred embodiment of the invention has been described wherein the tool 10 is provided with a frame 14 resting on the ground, a tool according

to the invention can also be without frame and can be provided for being used by arms, like a portable electric drill.

Claims

1. Tool for carrying out recessed seats (S) for electric devices and the like in a wall (W), said tool comprising a motorised cutting tool (42) able to penetrate the wall (W) while removing the material thereof with an advance movement perpendicular to the wall itself, **characterised in that** the motorised cutting tool is constituted by a continuous track (42) provided with cutting tools (54), said track (42) being guided in order to follow, in the condition of use, a run having two overlapped parallel horizontal branches (56, 58), joined by two curved opposed return sections at 180°, a return front section (60) of which is an active section able to engage the wall (W) thereby removing the material so as to form therein a seat (S) having a squared cross-section that presents a width corresponding to the width of the track (42) and an height corresponding to the distance between the external faces of the two branches (56, 58) of the track.
2. Tool according to claim 1, **characterised in that** the track (42) is provided with a plurality of cutting members (54) that are staggered in order to remove the material of the wall (W) according to repetitive cycles of successive transversally contiguous regions.
3. Tool according to claim 2, **characterised in that** the track (42) is constituted by a sequence of transversal splines (52), each of them bearing a respective cutting member (54) that is staggered with respect to that of the preceding spline (52).
4. Tool according to claim 2 or claim 3, **characterised in that** each cutting member (54) is constituted by a plate made of hard metal.
5. Tool according to claim 4, **characterised in that** each plate (54) is made of a metallic carbide, like Widia®.
6. Tool according to any of the preceding claims, **characterised in that** it comprises:
 - a base plate (12);
 - a slide (28) sliding on the base plate (12) and supporting a pair of lay shafts (44, 46) that support in turn respective rolling members (48) of return of the track (42) in correspondence with said return sections, wherein the shaft (44) corresponding to the return section opposed to the

active section (60) is motorised for imparting to the track (42) the circulation movement, the slide (28) being motorised for imparting to the track (42) an advance movement during the execution of the seat (S) and a back movement after having executed the seat (S); and

- a guard (76) fixed to the base plate (12), said guard surrounding the track (42) and presenting a front edge (78) defining a face against the wall (W), the movement of the slide (28) being perpendicular to the face.

7. Tool according to claim 6, **characterised in that** it comprises a frame (14) resting on the ground that supports the base plate (12) in order to allow the adjustment in height of the plate (12), of the slide (28) and of the track (42).

8. Tool according to claim 6 or 7, **characterised in that** the frame (14) comprises a pair of uprights (16) to which the base plate (12) is fixed so as to be adjustable in height, **in that** the two uprights (16) are interconnected by a crosspiece (20), and **in that** the frame (14) further comprises a pair of horizontal props (24) departing from the respective uprights (16) and ending with respective screw jacks (26) that, when using the tool, contrast against the lower part of the wall (W) in which it is desired to carry out a recessed seat (S).

9. Tool according to any of the claims from 6 to 8, **characterised in that** the elements (16, 24) of the frame (14) are connected by means of clamps (18, 22) for allowing to disassemble said frame (14) and to group together the elements themselves for transport convenience.

10. Tool according to any of the claims from 6 to 9, **characterised in that** the track (42) is motorised so as to circulate in such a way that the cutting members (54) remove the material of the wall (W) down from above, and **in that** below the track (42) and in a region contiguous to the front edge (78) of the guard (76) the base plate (12) bears a suction mouth (80) for the removed material, said mouth being connectable to a suction apparatus by means of a pipe (H).

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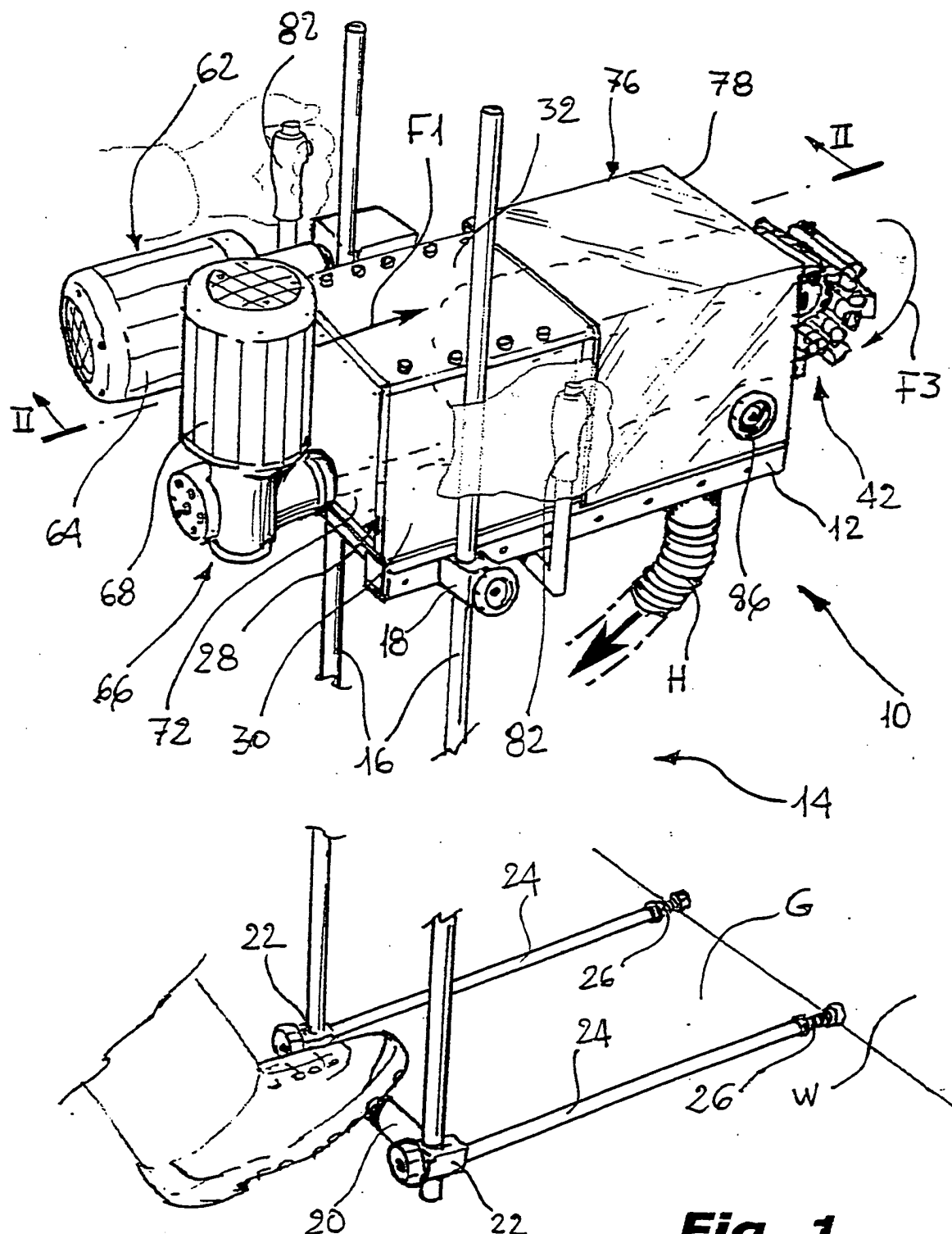
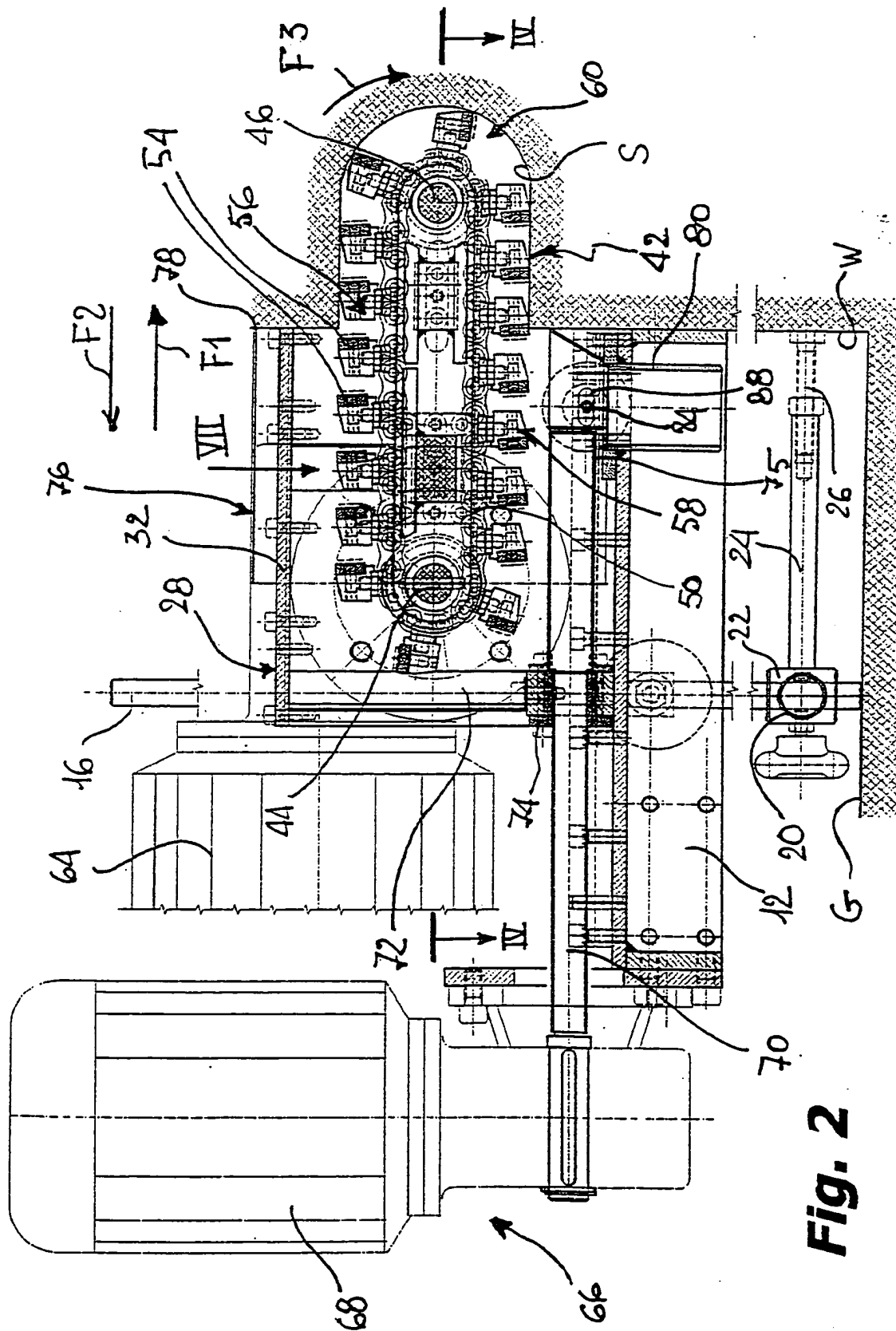
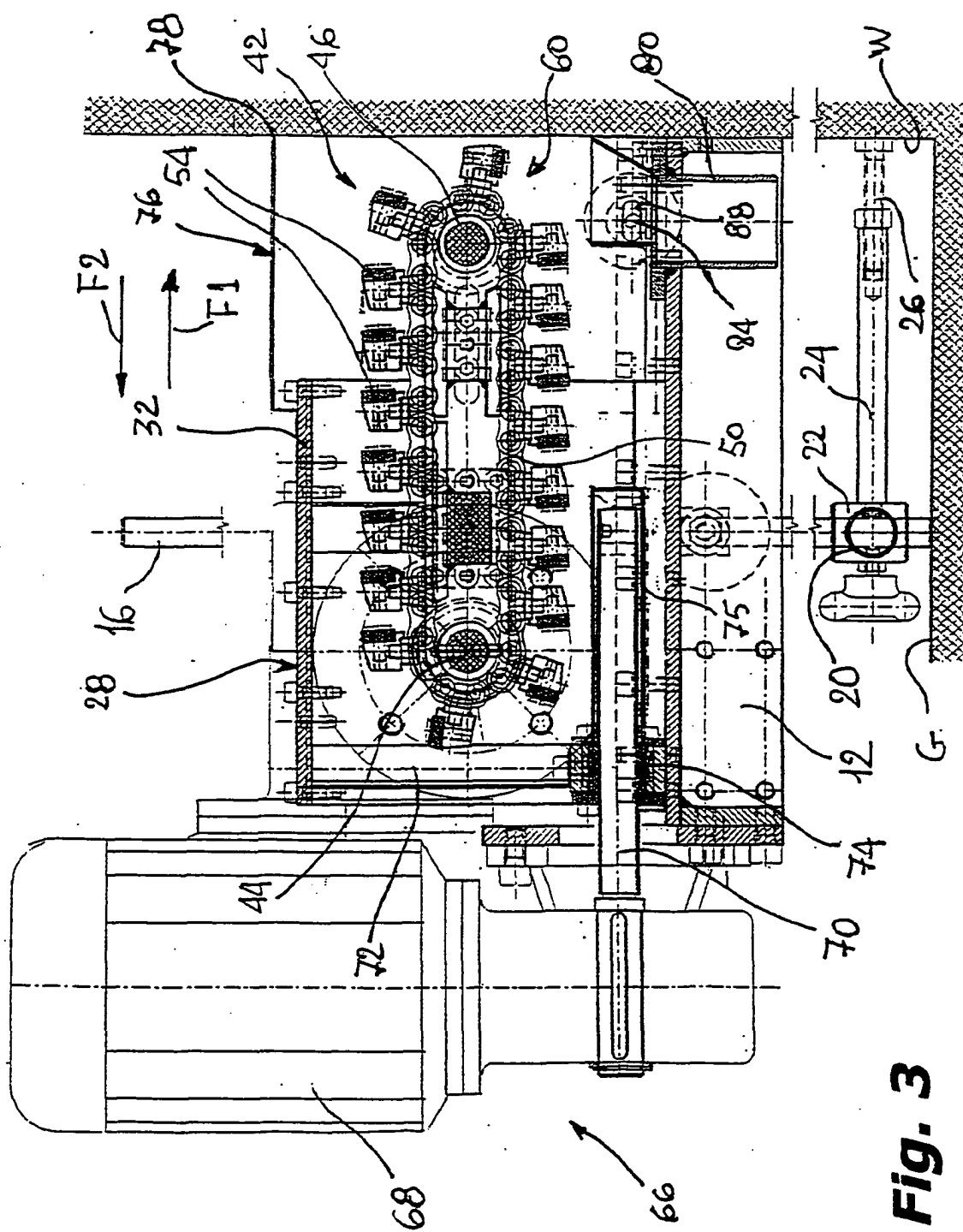
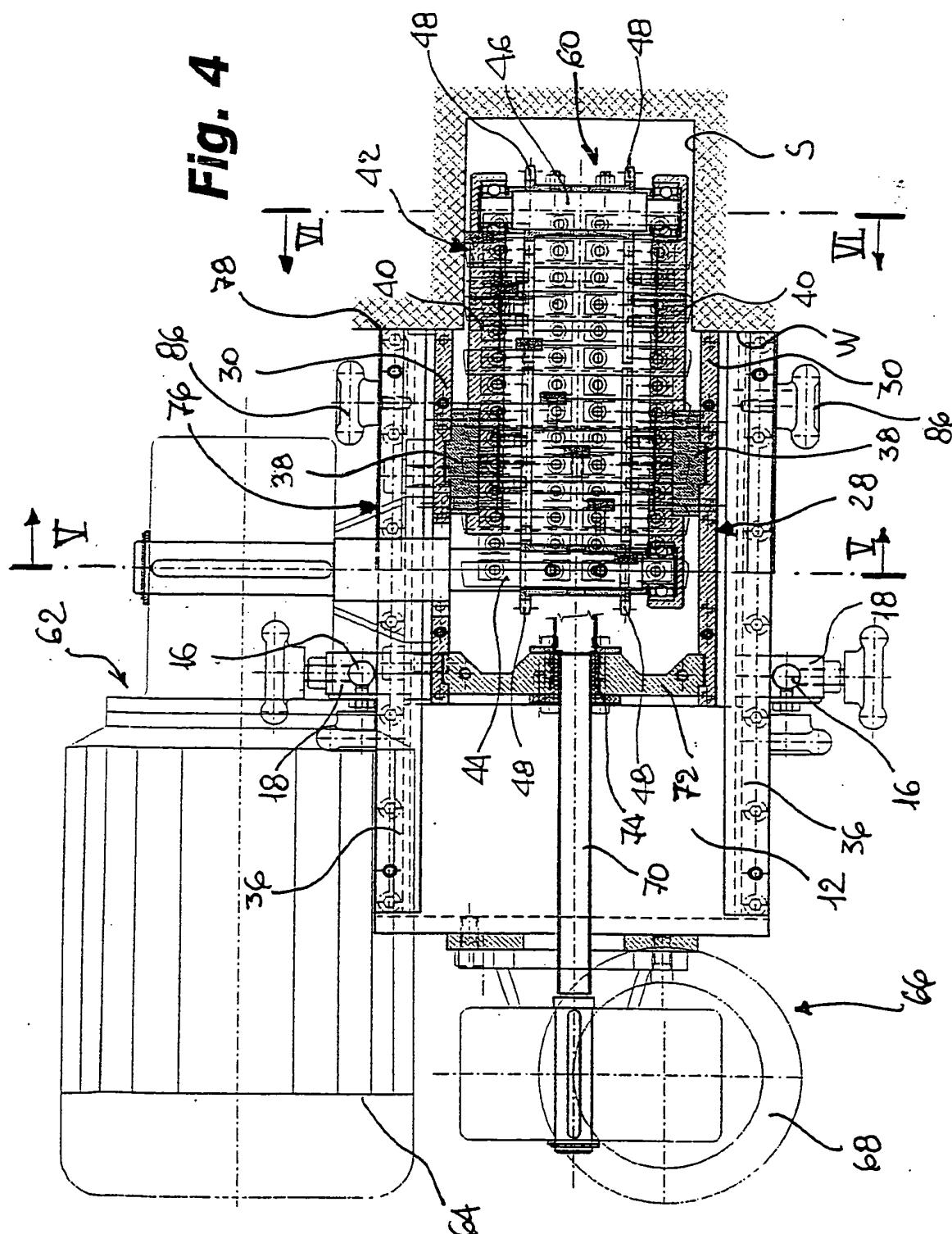
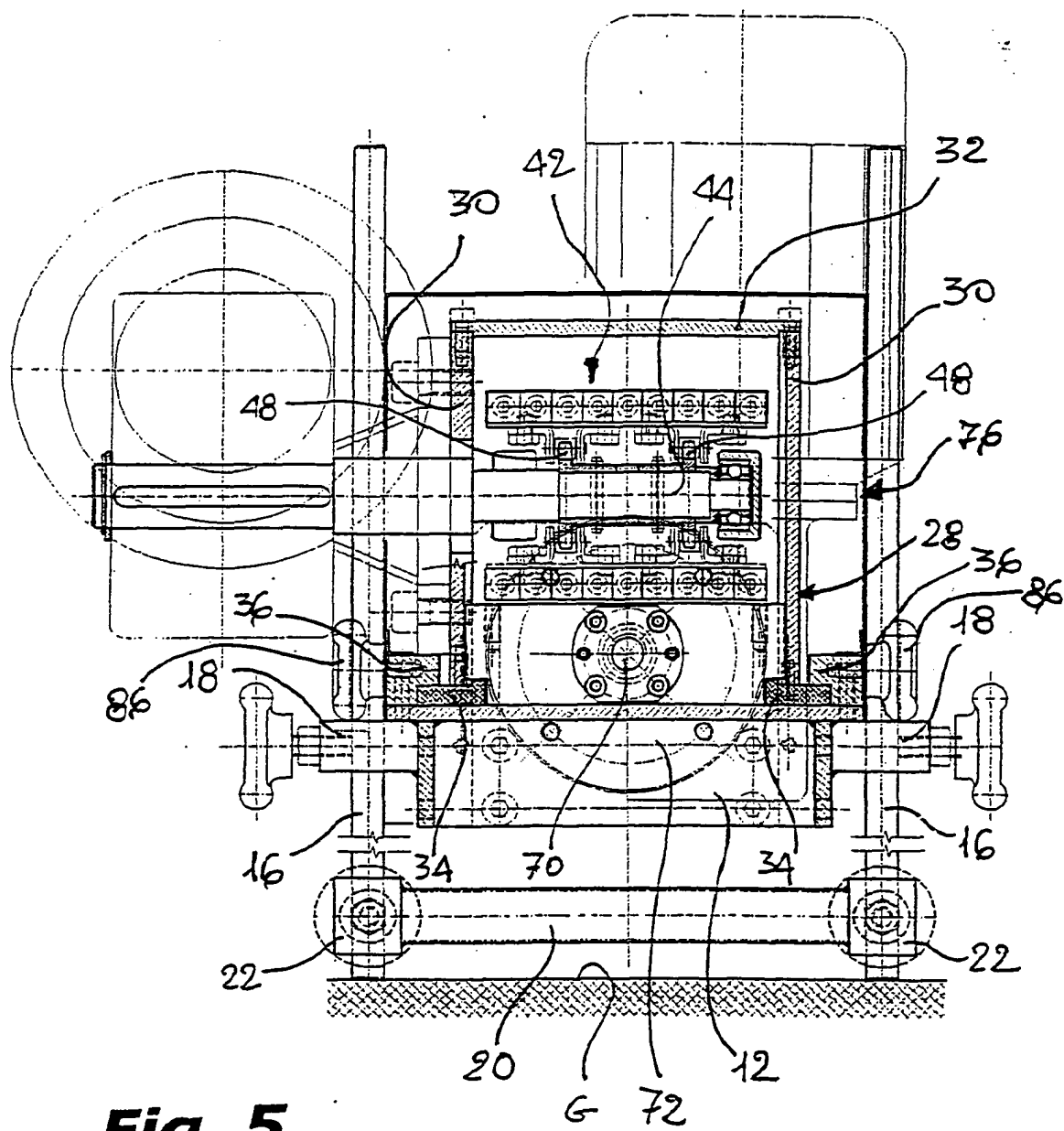


Fig. 1









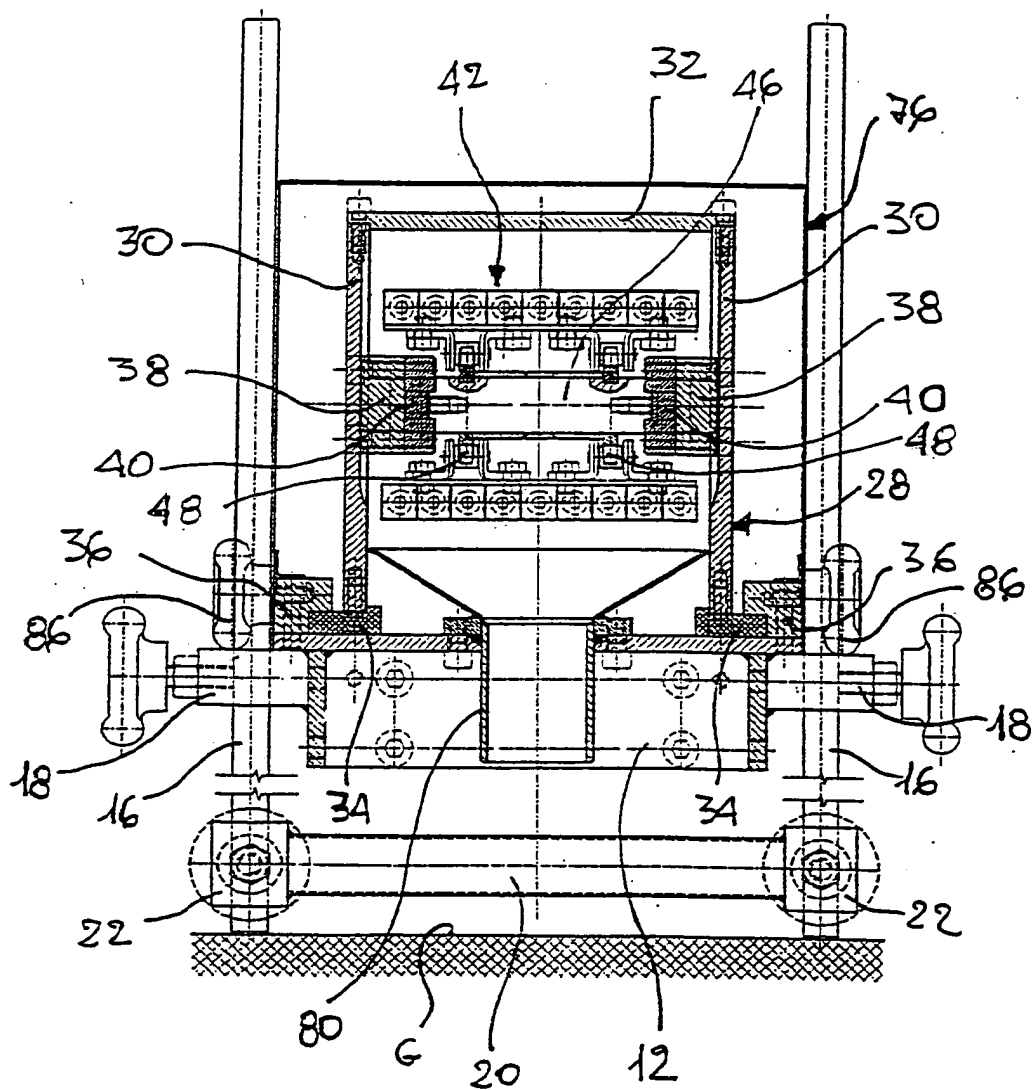


Fig. 6

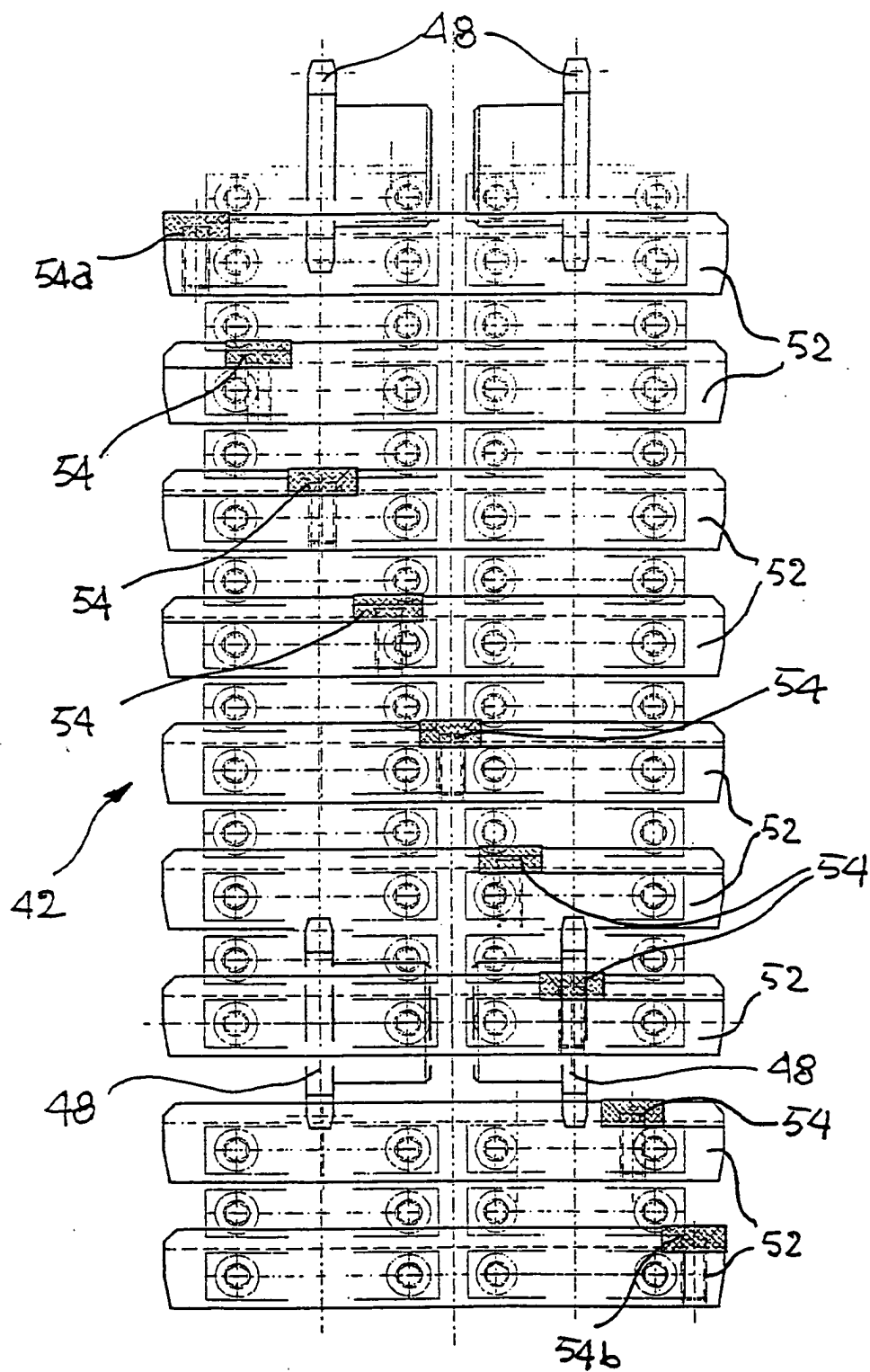


Fig.7