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(71) Applicant: **Svend Jonni Nielsen**
9530 Stovring (DK)

(72) Inventors:
- **Madsen, Michael Gramstrup**
  Guangzhou Panyu 511431 (CN)
- **Nielsen, Svend Jonni**
  9530 Stovring (DK)

(74) Representative: **Schmidt, Jens Joergen et al**
Patentgruppen ApS,
Arosgaarden,
Aaboulevarden 31
8000 Aarhus C (DK)

(54) Hand-held grinding tool with replaceable grinding-plate part

(57) There is described a hand-held grinding tool (1,101,201) with a replaceable grinding-plate part (13,113,213), preferably consisting of a steel plate, where on a grinding surface there is applied an abrasive coating in the form of grains of hard metal, which is preferably secured by soldering. The hand tool further comprises a handling part and clamping means (8,10,14,125,208,214) for clamping the grinding-plate part to the handling part (2,202) in a replaceable manner. By being able to replace the grinding-plate part alone, considerable savings are achieved in the use of the tool, while at the same time the advantages of the use of grinding plates with hard metal grains are also achieved.

The grinding tool according to the invention is intended for grinding by hand, i.e. without a motor-driven movement of the grinding surface, and is preferably configured in a light construction of plastic, aluminium, wood or the like, and can be configured with or without a handgrip, and can be provided with an arrangement for the mounting of a shaft for grinding with the user standing upright.

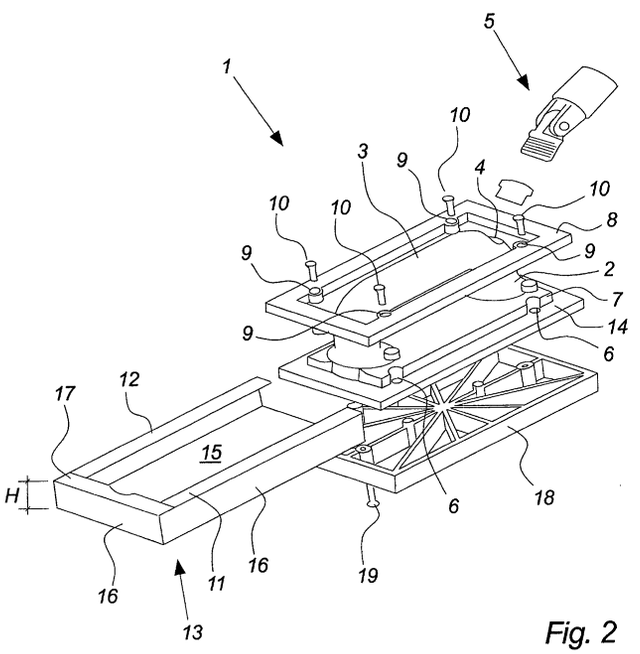

Fig. 2

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Description

[0001] The present invention relates to a hand-held grinding tool with a replaceable grinding-plate part, preferably consisting of a steel plate, where on a grinding surface there is laid an abrasive coating in the form of grains of hard metal, which are preferably secured by soldering.

[0002] The grinding tool according to the invention is intended for grinding by hand, i.e. without a motor-driven movement of the grinding surface, and is preferably configured in a light construction of plastic, aluminium, wood or the like. The tool can be configured with or without a handgrip, and can be provided with an arrangement for the mounting of a shaft for upright grinding.

BACKGROUND OF THE INVENTION

[0003] The soldering of hard metal grains on steel is a known technique and is used, among other things, for rotating grinding tools in both trade and industry. There are also produced smaller hand tools with hard metal grains such as files, hand-held sanding pads and grinding boards of steel. Sanding pads with a replaceable steel sanding plate with hard metal grids are also known, in which the sanding plate is fastened to the body part by means of hook-and-loop fastener, such as Velcro. However, such fastening can only take up a magnitude of the transverse stresses during use of the tool limited by the ability to be separated again manually.

[0004] Known hand-held grinding tools with hard-metal grains have hitherto been produced in steel plate of 2-3 mm thickness, where the grains are soldered directly on to the supporting part of the construction, and in a size of 200-250 cm^2 with welded-on or secured handgrip. Alternatively, as described in EP-A-1 260 317, use is made of a thin steel plate of less than 2 mm, e.g. between 0.1 and 1 mm, which is secured to one or more layers of another lighter material, e.g. by soldering, brazing, gluing or welding, in the formation of a composite structure. As starting point, the known hand-held grinding tools are preferably produced for the flooring trade for the grinding of the edges of smaller floor areas, where due to the working position the weight is of no great significance, in that the weight of the tool does not have to be borne by the user during the use of the tool. Although hand-held grinding tools with hard-metal grain secured to a steel plate have a relatively long life, i.e. that they retain their grinding characteristics even with long-term use, there is a quite large turnover of such tools during a building process, the reason being that the tools are discarded when they are worn down. Therefore, the costs involved in procuring such tools constitute operational expenses for the building process.

[0005] Other known hand-held grinding tools for similar applications consist of a traditional float on which sandpaper or emery cloth is mounted by means of pins, screws or spring-loaded clips. However, sandpaper is outdated since the grinding effect is limited and because sandpaper, where it can be used, has a short life with many changes as a consequence.

[0006] Particularly in the building trade, due to the use of many new materials there is an increasing demand for being able to adjust and grind the building elements and the materials in general, such as glass fibre, epoxy, paint, lacquer, fillers etc., but also known materials such as plaster and bricked or moulded walls.

[0007] The known selection of materials in the production of tools with a strong self-supporting steel plate results in high weight, and herewith a limitation in the sizes of grinding pads which can be used in practice. This is solved partly by the earlier-mentioned tool with a plate of composite structure which, however, is more expensive to purchase, whereby the operational costs are increased.

[0008] With the invention, it is desired to provide a hand-held grinding tool which utilises the grinding characteristics and long life of the hard-metal coating, at the same time that a light and user-friendly hand-held tool is made possible with limited operational costs involved in the use thereof.

[0009] This is achieved with the hand-held grinding tool according to the present invention, where said tool comprises a handling part, a grinding-plate part, which comprises a metal plate, preferably a steel plate with grinding surface with abrasive coating, and clamping means for clamping of the grinding plate part to the handling part in a replaceable manner.

[0010] By including clamping means which permit a replacement of the grinding plate part and a strong mounting of the grinding-plate part, it is made possible that the handling part, which is preferably made of a lighter material than the grinding-plate part, can be reused with a new grinding-plate part, whereby the operational costs involved in the use of the grinding tool are considerably reduced in relation to tools where the whole of the tool is discarded when the grinding characteristics of the grinding plate have been worn down. Moreover, the amount of wastage from the building process is reduced. The same handling part can function as a standard part which can be used with different types of grinding-plate parts with different grain sizes and grain types, with or without grinding edges at right-angles to the grinding-plate etc.

[0011] It is especially preferred that the grinding tool's clamping means comprise an operating element for fastening the grinding-plate part to, respectively loosening the grinding-plate part from the handling part, inasmuch as the operating element is arranged to be operated manually from that side of the grinding tool which faces substantially away from the grinding surface. It is hereby achieved that the grinding-plate part can be placed on a horizontal surface, such as a floor or a table, while the handling part is mounted on the tool by means of the clamping means, whereby a comfortable work position

as well as an easy and precise mounting is achieved.

BRIEF DESCRIPTION OF THE INVENTION

[0012] The present invention relates to a hand-held tool for the grinding of surfaces, said tool comprising

a handling part,

a grinding-plate part which comprises a metal plate, preferably a steel plate, with grinding surface with abrasive coating, and

clamping means for replaceable clamping of the grinding-plate part to the handling part.

[0013] Preferably, the grinding surface is substantially plane, but can within the scope of the invention also have a curved surface, such as a single or double-curve grinding surface. The circumferential extent of the grinding surface can be configured so that it corresponds to an envisaged application, but it is generally preferred that use is made of a rectangular grinding surface, preferably with a size of 40-300 mm in width and 50-1000 mm in length.

[0014] The abrasive coating consists preferably of hard-metal grains which are fastened on the metal plate. The fastening is preferably effected by soldering of the grains on the metal plate, but also brazing, welding and gluing are among the methods which can be used for fastening the grains to the metal plate.

[0015] A special aspect is that the hand-held grinding tool's clamping means can comprise an operating element for fastening respectively loosening the grinding-plate part to/from the handling part, inasmuch as the operating element is arranged to be operated manually from that side of the tool which faces substantially away from the grinding surface. These clamping means can preferably comprise threaded rods which are either screwed down into corresponding holes with internal threads in the grinding-plate part itself, or which pass through a clamping part of the handling part and down into corresponding holes with internal threads in the handling part, where a part of the grinding-plate part arranged for this purpose is clamped firmly between the clamping part and a contact part of the handling part. The operating element can, for example, be a wing screw or other arrangement for direct manual operation, but it can also be an internal slot or external contact surfaces on the head of a threaded rod for engagement with a tool, e.g. a screwdriver or a key. Other clamping means can also be used, such as clips or eccentric cams which, by turning with an operating element, firmly clamp a part of the grinding-plate part.

[0016] For co-operation with the hand tool's grinding-plate part, the clamping means can comprise an engagement part which is secured to the rear of the grinding surface, such as e.g. a bush with an internal thread.

[0017] A particularly suitable grinding-plate part further comprises two plate parts which extend at a first distance away from the grinding surface and substantially parallel with two opposite edges of said surface, inasmuch as the plate parts are arranged to co-operate with the clamping means. These two or more plate parts are particularly suitable for being clamped firmly by e.g. a clamping part, which by operation of the operating element clamp the plate parts between the clamping part and a contact surface of the hand tool, and are preferably extending in a plane substantially parallel to the plane of the grinding surface. This type of tools according to the invention and having a clamping part for clamping such plate parts against a contact surface have preferably of larger grinding surface area of e.g. 150 to 3000 cm^2, preferably of 200 to 800 cm^2 with e.g. a rectangular shape of 80 to 300 mm in width and 150 to 1000 mm in length, preferably of 100 to 200 mm in width and 200 to 800 mm in length.

[0018] The grinding-plate part's metal plate can at at least one edge of the grinding surface comprise a side grinding surface with an abrasive coating, said side grinding surface extending substantially at right-angles to the grinding surface, so that the side grinding surface and the grinding surface form an external comer. These two grinding surfaces can hereby be used for simultaneous grinding or processing of two material surfaces which form an internal comer.

[0019] In order to achieve flexibility in the height of the side grinding surfaces, the tool can also comprise a spacing piece which is arranged in a replaceable manner between the handling part and the rear of the grinding surface.

[0020] The invention also relates to grinding-plate parts which are configured to form part of the hand-held tool according to the invention.

[0021] Furthermore, the present invention relates to a hand-held tool, such as the one previously described, for the grinding of surfaces, said tool comprising

a handling part comprising a handgrip,

a grinding-plate part which comprises a metal plate, preferably a steel plate, with a grinding surface having an abrasive coating,

wherein an opening for mounting of a shaft is provided in said handgrip. The opening is so arranged, that the handgrip may be used for manual operation of the tool without being hindered or impeded by the opening. A mounting part may provided within said opening, preferably so that it substantially is fully accommodated within the opening, the mounting part comprising a length of a profile of a C-shaped cross-section and a slide part provided therein, the slide part having a through-hole provided with an internal thread. Thereby, the point of attack of the forces from the shaft on the tool may be varied.

BRIEF DESCRIPTION OF THE DRAWING

[0022] Preferred embodiments of the invention are shown as examples hereof in the accompanying drawing, where

Fig. 1 shows a first embodiment seen in perspective,

Fig. 2 shows an exploded view in perspective of the embodiment in Fig. 1,

Fig. 3 shows a second embodiment seen in perspective,

Fig. 4 shows an exploded view in perspective of the embodiment in Fig. 3,

Fig. 5 shows a third embodiment seen in perspective,

Fig. 6 shows the embodiment in Fig. 5 in the opened state,

Fig. 7 shows an exploded view in perspective of the embodiment in Fig. 5, and

Fig. 8 shows the embodiment in Fig. 5 seen in perspective, where the mounting of a shaft on the tool is shown.

DETAILED DESCRIPTION OF EXAMPLES OF THE INVENTION

[0023] A first embodiment of the invention is shown in figs. 1 and 2, and is a hand-held grinding tool 1 which consists of a rectangular handling part 2 which is provided with a handgrip 3 for direct manual use of the tool 1, and an opening 4 with internal thread for mounting of a swivel 5 or universal joint 5 which is used for mounting a shaft on the tool. The handling part 2 has four openings 6 with internal threads disposed in a recess 7 in the edge of the handling part 2. A mounting frame 8 has corresponding openings 9 without internal threads, and can be clamped to the handling part 2 by means of four screws 10 with a head with slot, e.g. a wide straight slot, which is easy to clean before it is operated with a screwdriver. When the screws 10 are tightened, the mounting frame 8 functions as a clamping part which clamps the plate parts 11, 12, 17 of the grinding-plate part 13, which extend parallel with the grinding sole of the grinding-plate part 13, between the mounting frame 8 and a contact surface 14, which is formed by the recess 7 in the handling part 2. The grinding-plate part 13 is hereby clamped to the handling part.

[0024] The grinding-plate part 13 is a steel plate, on one side of which there is soldered hard-metal grains, so that a surface with abrasive coating is created. The grinding sole, of which only the rear 15 can be seen directly in the figures, is rectangular in shape and extends as a plane surface. At the two long edges of the grinding sole, and at the one short edge, the steel plate is bent upwards so that a side grinding surface 16 is formed. At a given height H, the steel plate is bent again so that three plate parts 11, 12, 17 are formed which extend parallel with the grinding sole, and which are suitable for co-operation with the mounting frame 8 and the contact surface 14 of the recess 7 for clamping of the grinding-plate part 13 to the handling part 2. Between the grinding-plate part 13 and the handling part 2 there is placed a spacing piece 18 with a height of e.g. 5-50 mm, which is secured to the handling part 2 in a removable manner with two screws 19. The rear 15 of the grinding sole is supported by the distance piece 18, which can be changed so that the tool 1 can be adapted for use with different grinding-plate parts 13 with vertical side grinding surfaces 16 of different heights H.

[0025] When the abrasive coating on the grinding-plate part 13 is worn down or needs to be replaced for other reasons, the four screws 10 which hold the mounting frame 8 are loosened and the grinding-plate part can be slid out towards the one short end of the grinding-plate part 13. Thereafter, a new grinding-plate part 13 can be pushed in and secured by tightening the four screws 10. In cases where the new grinding-plate part 13 has a side grinding surface 16 of a height H different to that of the old grinding-plate 13, the distance piece 18 is dismounted and a new distance piece 18 of suitable thickness is mounted on the handling part 2 before the new grinding-plate part 13 is slid in.

[0026] In an alternative to the first embodiment, use is not made of a mounting frame 8, and instead the edges 11, 12, 17 of the grinding-plate part 13 are provided with holes which the screws 10 pass through for the clamping of the grinding-plate part 13 to the handling part 2.

[0027] A second embodiment of the invention is shown in figs. 3 and 4, and is a hand-held sanding block 101 which comprises a handling part 102 with a through-going opening 120 and a circular recess 121 in the upper surface 122 of the handling part 102, so that space is formed for the housing of a clamping element in the form of a screw 123 with a head 124, in which head 124 there is provided a wing 125 for manual operation of the screw 123. The head 124 of the screw 123 passes down in the recess 121, so that when the screw 123 is mounted, the upper side 126 of the head 124 forms part of a plane which is formed by the upper surface 122 of the handling part 102. The threaded part 127 of the screw 123 extends through the handling part 102 and engages with a bush 128 which is provided with an internal thread and is soldered on the rear 115 of a grinding-plate part 113. The grinding-plate part 113 has bent-up edges which form side grinding surfaces 116 along all four edges of the rectangular grinding plate part 113. The handling part 102 is provided with a recess 129 on its lowermost edge, and the four side grinding surfaces 116 fit into this recess 129.

[0028] A third embodiment of the invention is a hand-held grinding tool 210 as shown in Figs. 5-8, where the mounting frame 208 is connected to the handling part 202 by a hinge 230 along one of the narrow edges of

the handling part 202. Close to the other end of the handling part 202 there is placed two clamping parts 231 which are pivotally secured to the handling part 202 around a vertical axis, and which comprises a head 232 with a wing 233 which, by the turning of the part 231, enters into engagement with an inclined recess 234 in the mounting frame 208, so that the mounting frame 202 is clamped down against a contact surface 214 of the handling part 202, whereby the grinding-plate part 213 is held firmly on the handling part 202. The clamping parts 231 can be turned manually by the user gripping around the head 232 and the wing 233 with his/her fingers or with pliers, but can also be turned using a tool which fits down in the slot 236 which is formed in the heads 232 of the clamping parts 231. With the turning of the clamping parts 231 during the clamping of a grinding-plate part 213, the angular extent of the turn is limited by a stop 235 which the wing 233 abuts against when it stands in the optimal clamping position.

[0029] The grinding-plate part 213 has three plate parts 211, 212, 217 which extend parallel with the grinding sole of the grinding-plate part 213, and in which there are punched elongated holes 237 which fit together with conical projections 238 on the mounting frame 208 and elongated depressions 239 in the contact surface 214 of the handling part 202. For the changing of a grinding-plate part 213, the wings 233 of the clamping parts 231 are turned away from the stops 235, so that the wings 231 stand in a position as shown in Fig. 6, where the mounting frame 208 can be opened and the grinding-plate part 213 can be pushed out from the handling part 202. A new grinding-plate part 213 is mounted by being pushed in over the handling part 202, after which the mounting frame 202 is closed. The projections 238 are hereby pressed down through the punched-out holes 237 and into the depressions 239. The effect of the conical configuration of the projections 238 is partly that the punched-out holes 237 are secured precisely in the correct position, and partly that the plate parts 211, 212, 217 are clamped down against the contact surface 214 of the handling part 202.

[0030] In the exploded view in Fig. 7 it is seen that this embodiment can comprise a spacing piece 218, so that the tool 201 can be adapted for use of grinding-plate parts 213 with vertical side surfaces 216 of different heights H.

[0031] As shown in Figs. 7 and 8, a shaft 240 can be mounted on the hand tool 201 by means of a mounting part 241 which is placed in a cut-out 242 in the side of the moulded handgrip 203 and is secured with screws 243. The mounting part 241 is a profile with a C-shaped cross-section in which a slide part 244 can be displaced along the mounting part 241. The securing part 245 for the shaft 240 has an opening 246 through which a bolt 247 with an operating wing 248 can pass. On the other side of the clamping part 245, the bolt 247 passes through a spacing piece 249 which lies up against the outer side of the mounting part 241, and the threaded part 250 of the bolt 247 enters into engagement with a corresponding internal thread in a through-going opening 251 in the slide part 244. When the bolt is tightened, the outer end of the threaded part 250 will abut up against the inner side of the mounting part 241, while the slide part will be pressed the opposite way in the profile, and this effect will lock the bolt 247 in position. The securing part 245 can turn freely around the bolt 247, which is decisive for the use of the tool 201 with the shaft 240.

Claims

1. Hand-held tool (1, 101, 201) for the grinding of surfaces, said tool comprising
   a handling part (2, 102, 202),
   a grinding-plate part (13, 113, 213) which comprises a metal plate, preferably a steel plate, with a grinding surface having an abrasive coating, and
   clamping means (8, 10, 14, 125, 208, 214, 231) for clamping the grinding-plate part to the handling part in a replaceable manner.

2. Hand-held grinding tool according to claim 1, wherein the clamping means comprise an operating element (10, 125, 231) for fastening respectively loosening the grinding-plate part to/from the handling part and the operating element is arranged to be operated manually from that side of the hand tool which faces substantially away from the grinding surface.

3. Hand tool according to any of the previous claims, wherein the grinding-plate part comprises at least one opening (128) in which internal threads are formed for co-operation with the clamping means.

4. Hand tool according to any of the previous claims, wherein the grinding-plate part on the side opposite to the grinding surface comprises an engagement part (128) for co-operation with the clamping means.

5. Hand tool according to any of the previous claims, wherein the grinding-plate part further comprises at least two plate parts (11, 12, 17, 211, 212, 217) which extend at a first distance away from the grinding surface and substantially parallel with two opposing edges of said surface and said plate parts are arranged to co-operate with the clamping means.

6. Hand tool according to claim 5, wherein the clamping means comprise a clamping part (8, 208) which, by operation of the operating element, clamps said plate parts firmly between the clamping part and a

contact surface (14, 214) of the hand tool.

7. Hand tool according to any of the previous claims, wherein the metal plate at least at one of the edges of the grinding surface comprises a side grinding surface (16, 116, 216) with an abrasive coating, said side grinding surface extending substantially at right-angles to the grinding surface, so that the side grinding surface and the grinding surface form an external comer.

8. Hand tool according to any of the previous claims, which further comprises a spacing piece (18, 218) arranged in a replaceable manner between the handling part and the rear of the grinding surface.

9. Grinding-plate part (13, 113, 213) comprising a metal plate, preferably a steel plate, with a grinding surface with abrasive coating, said grinding-plate part being configured to form part of a hand-held grinding tool according to any of the claims 1-8.

10. Grinding-plate part according to claim 9, wherein the metal plate at least at one of the edges of the grinding surface comprises a side grinding surface (16, 116, 216) with an abrasive coating, said side grinding surface extending substantially at right-angles to the grinding surface, so that the side grinding surface and the grinding surface form an external comer.

11. Grinding-plate part according to claim 9 or 10, which comprises at least one opening (128) in which an internal thread is formed for co-operation with the clamping means.

12. Grinding-plate part according to any of the claims 9-11, wherein the side opposite of the grinding surface comprises an engagement part (128) for co-operation with the hand tool' clamping means.

13. Grinding-plate part according to claim 9 or 10, wherein the grinding-plate part further comprises at least two plate parts (11, 12, 17, 211, 212, 217) which extend at a first distance away from the grinding surface and substantially parallel with two opposing edges of said surface, wherein said plate parts are arranged to co-operate with the hand tool's clamping means.

14. Hand-held tool (1, 201) for the grinding of surfaces, said tool comprising

a handling part (2, 202) comprising a handgrip (3, 203),

a grinding-plate part (13, 213) which comprises a metal plate, preferably a steel plate, with a grinding surface having an abrasive coating,

wherein an opening (4, 242) for mounting of a shaft is provided in said handgrip (3, 203).

15. Hand tool according to claim 15, wherein a mounting part (241) is provided within said opening (242), the mounting part comprising a length of a profile of a C-shaped cross-section and a slide part (244) provided therein, the slide part (244) having a through-hole (251) provided with an internal thread.

16. Hand tool according to any of claim 14 or 15, furthermore having the technical features of the hand tools according to any of claims 1-8.

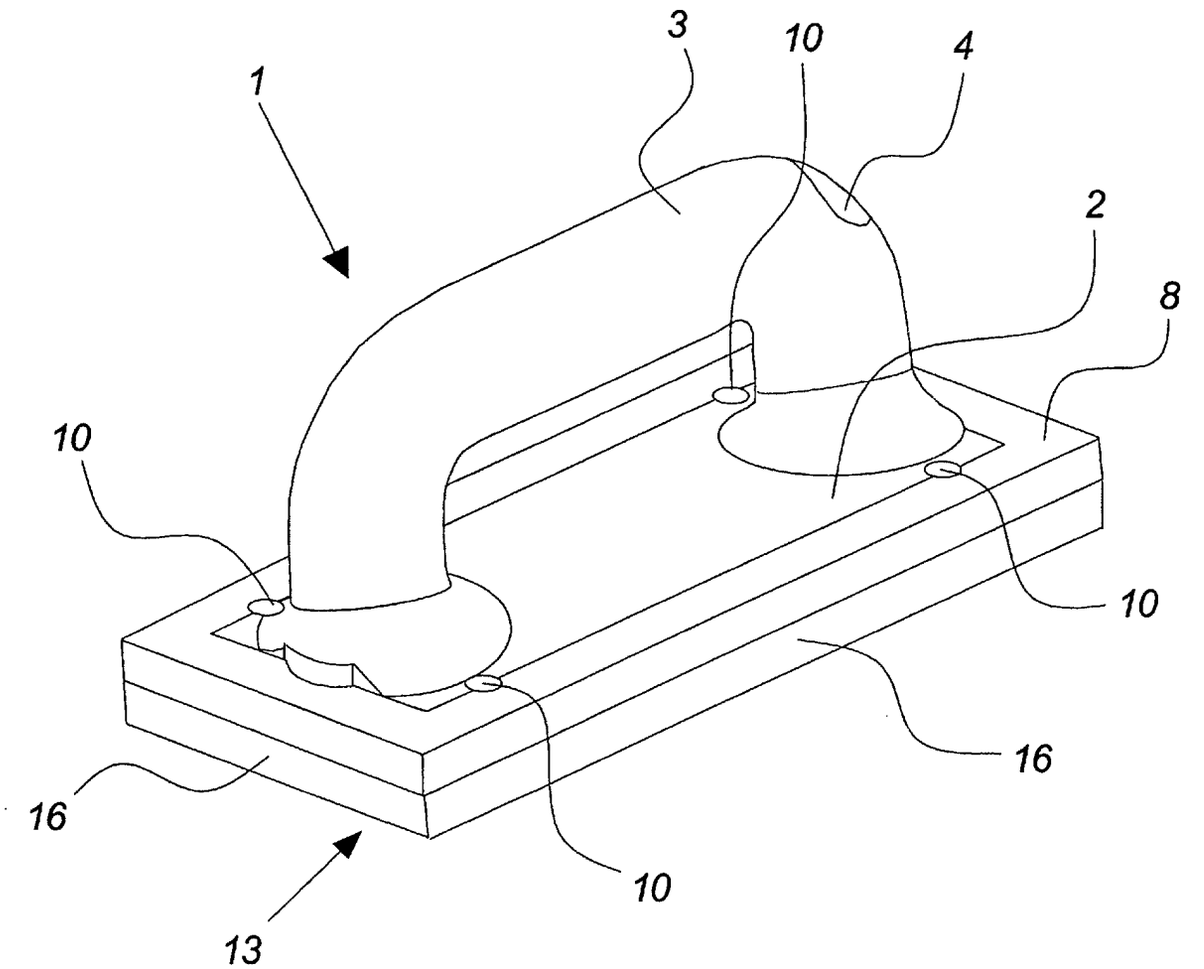

Fig. 1

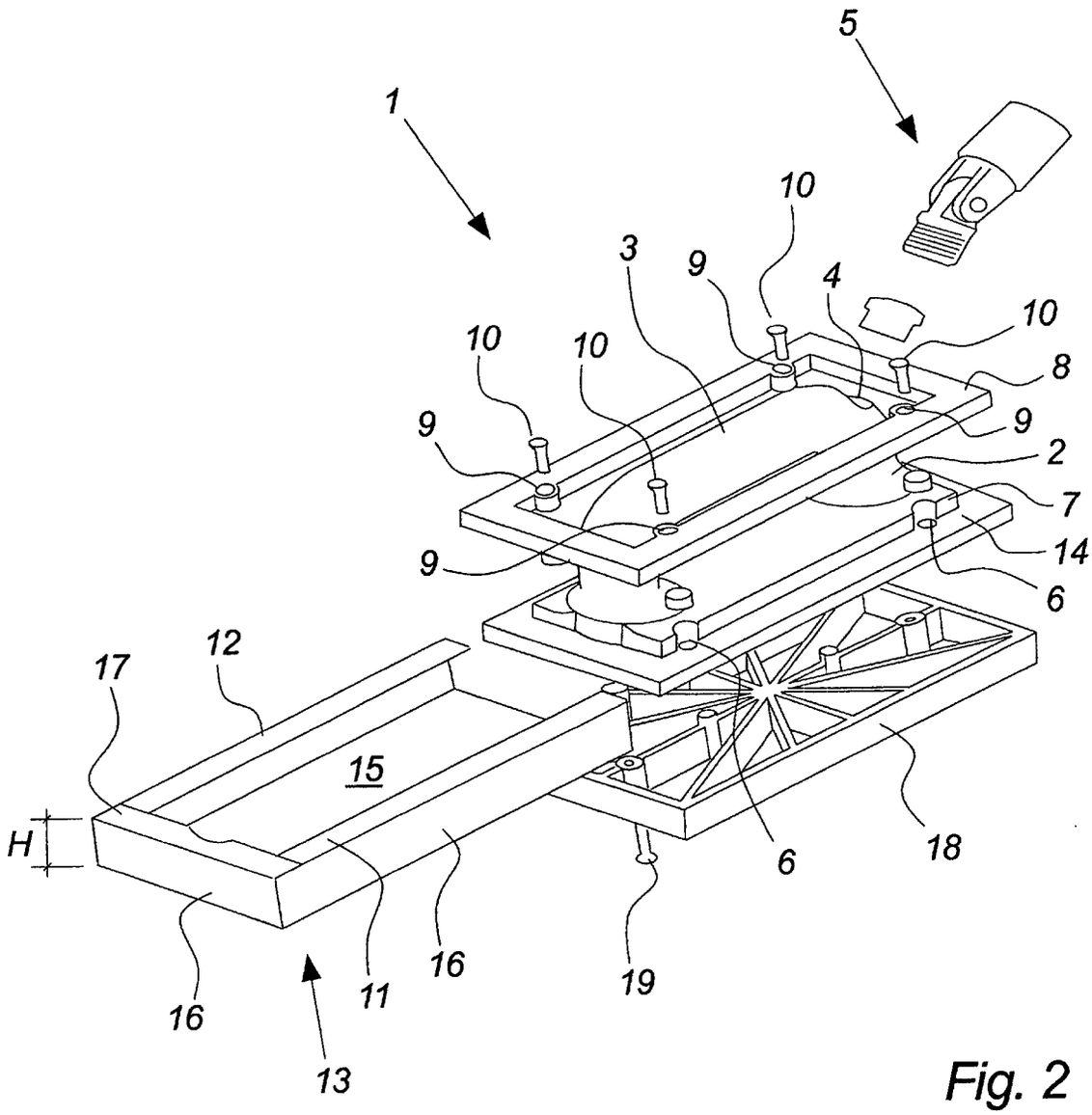

Fig. 2

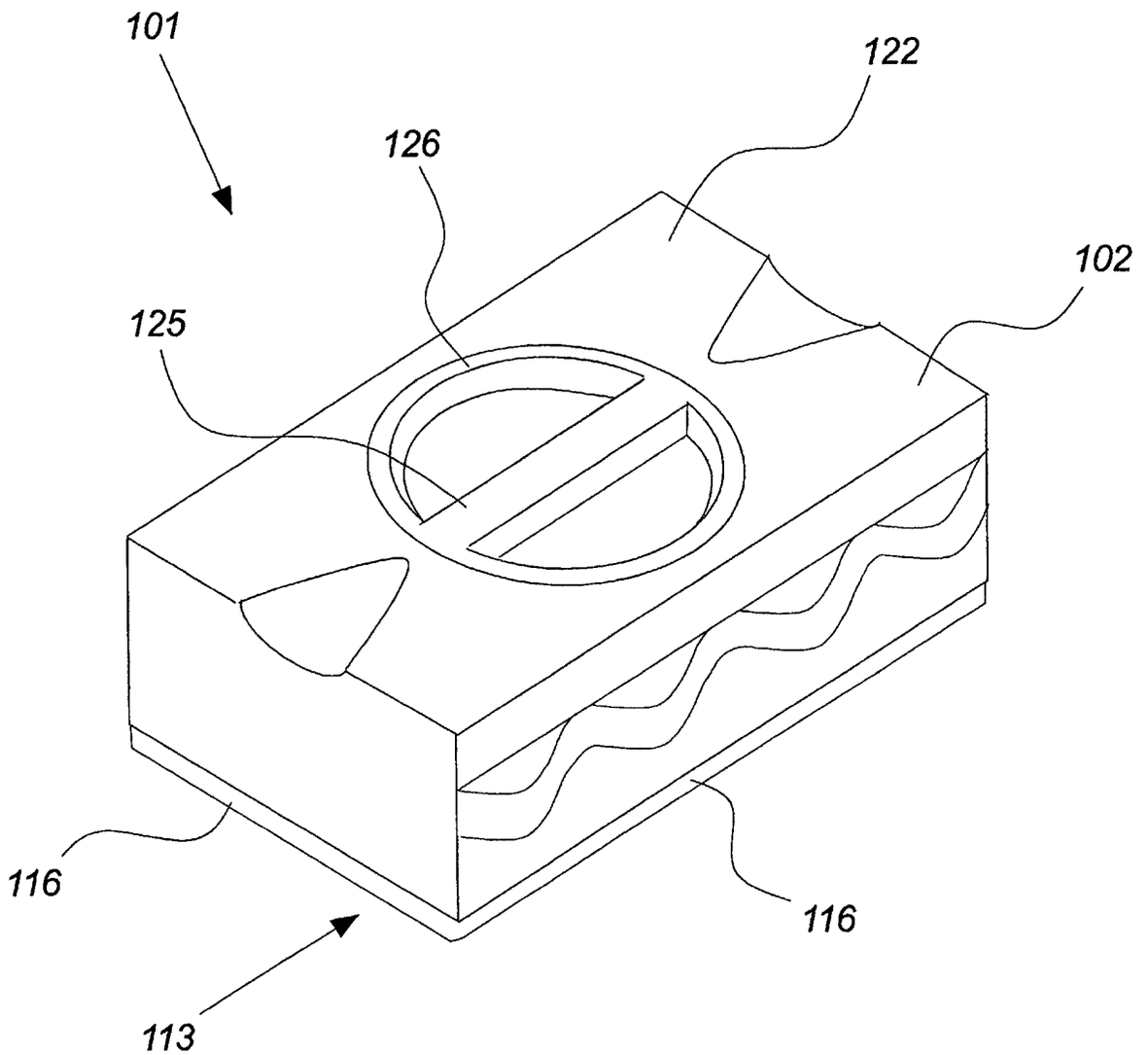

Fig. 3

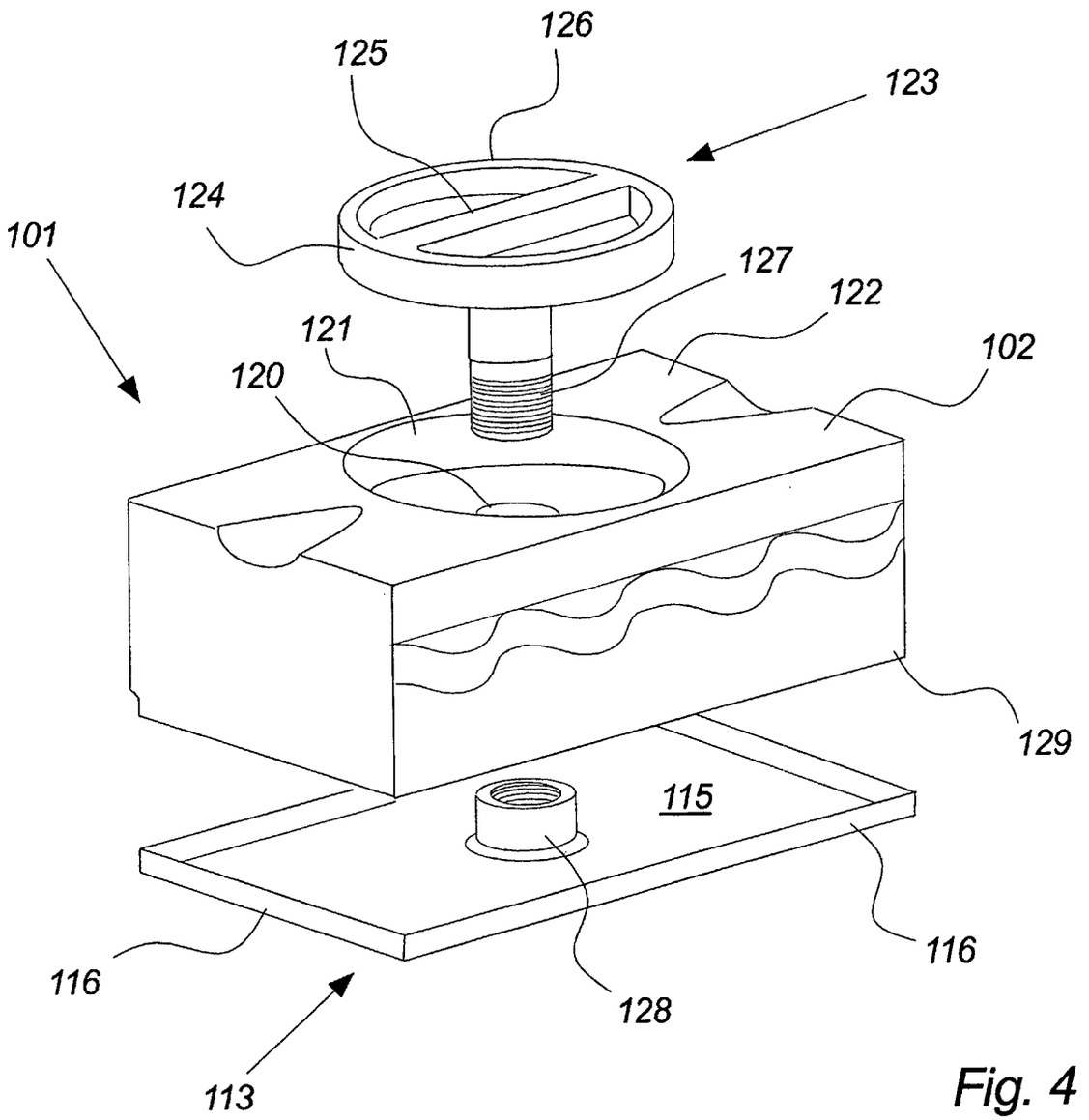

Fig. 4

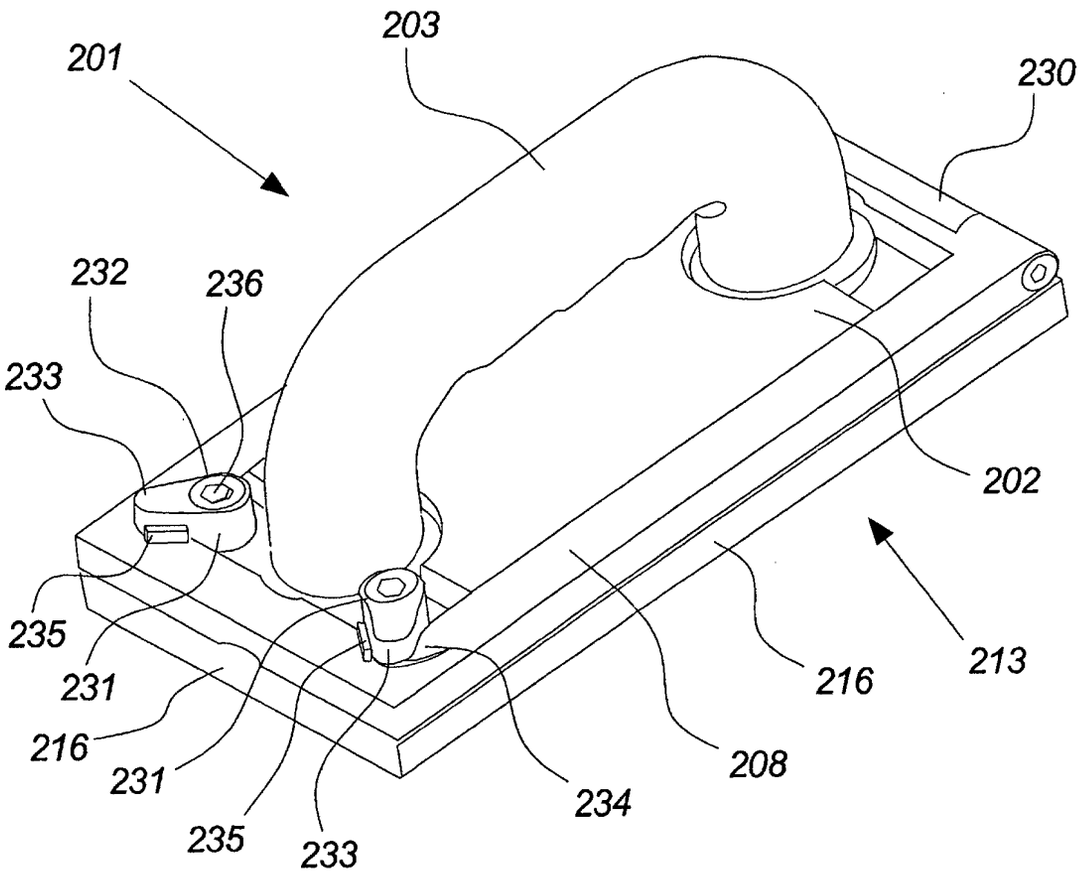
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Fig. 5

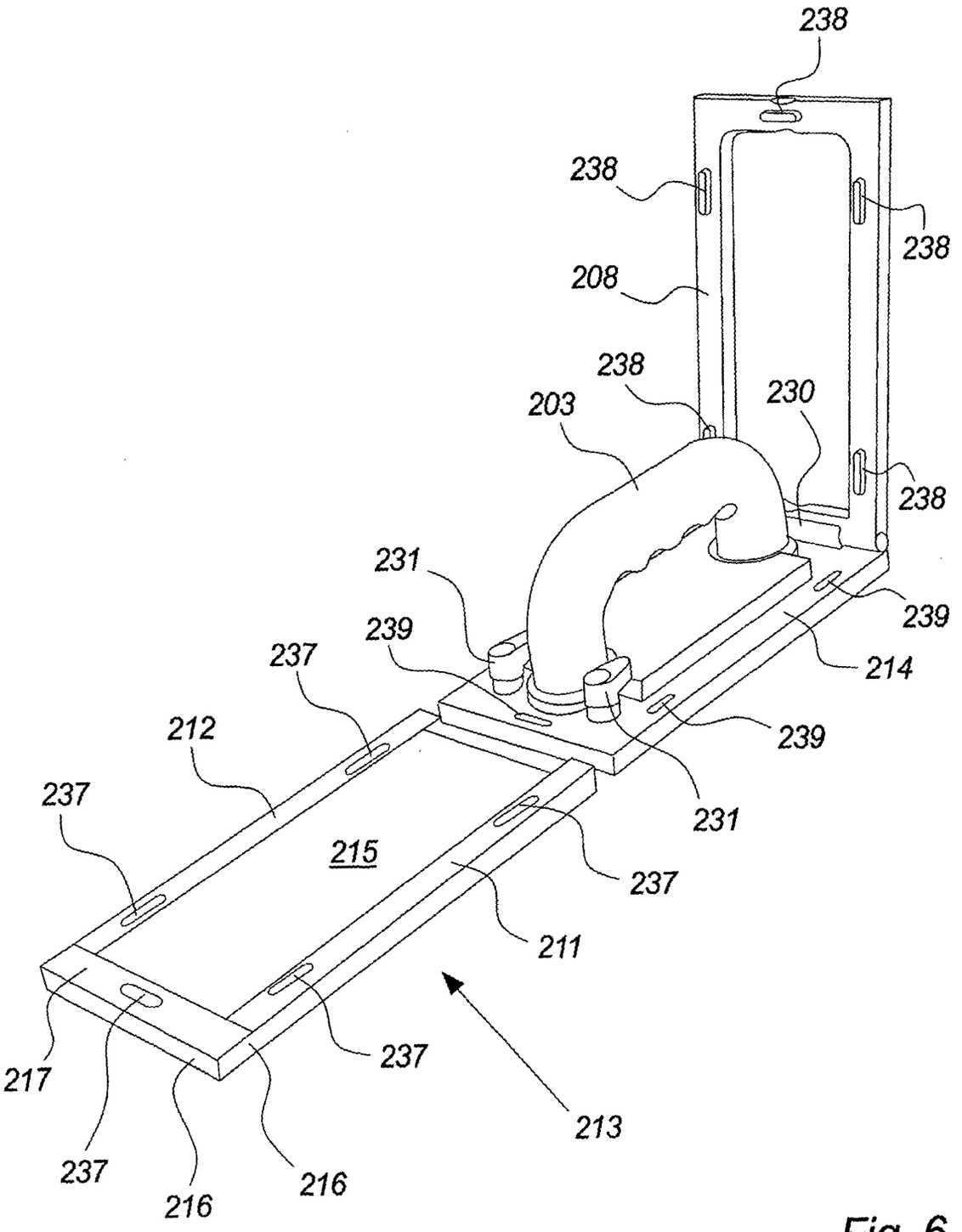
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Fig. 6

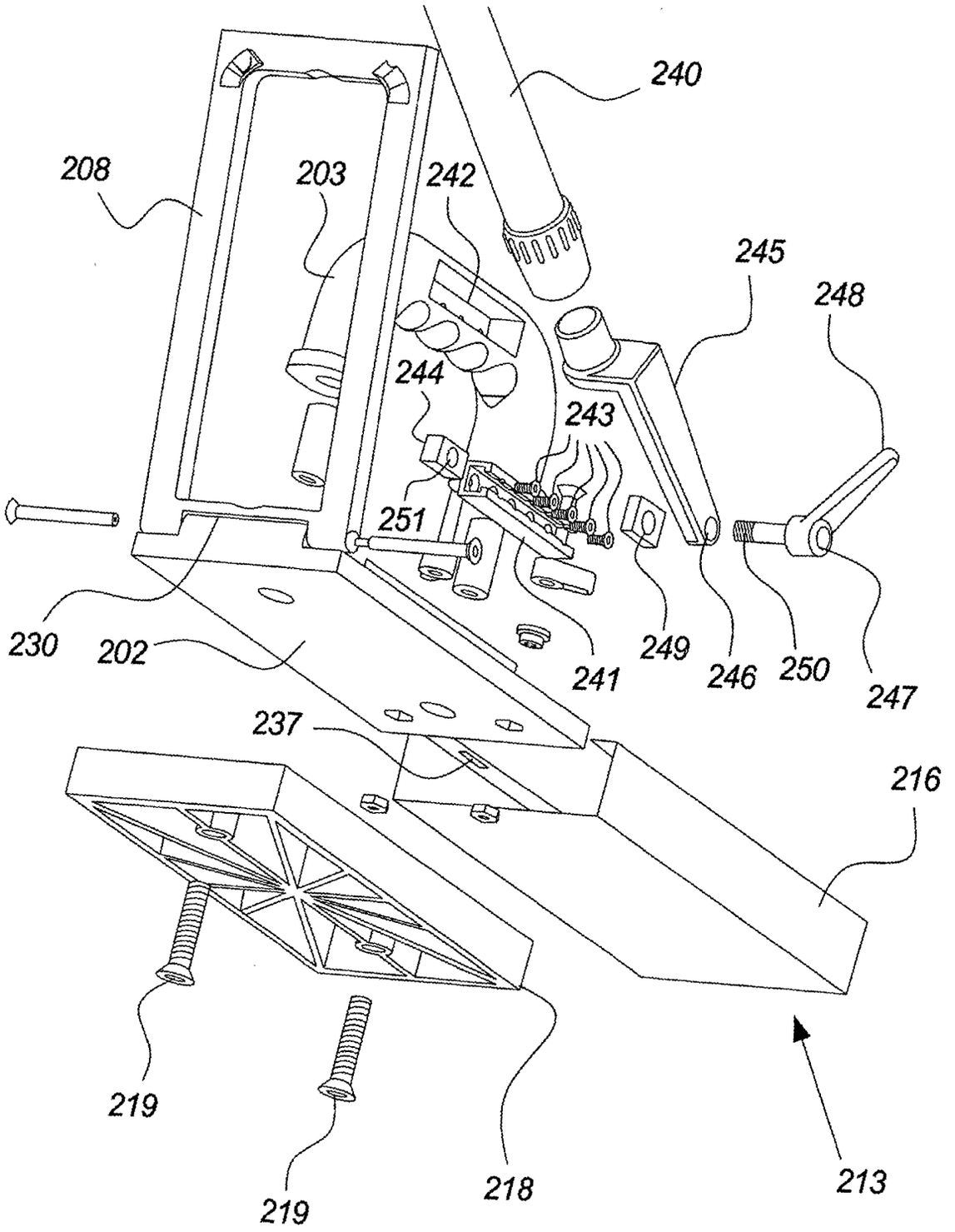
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Fig. 7

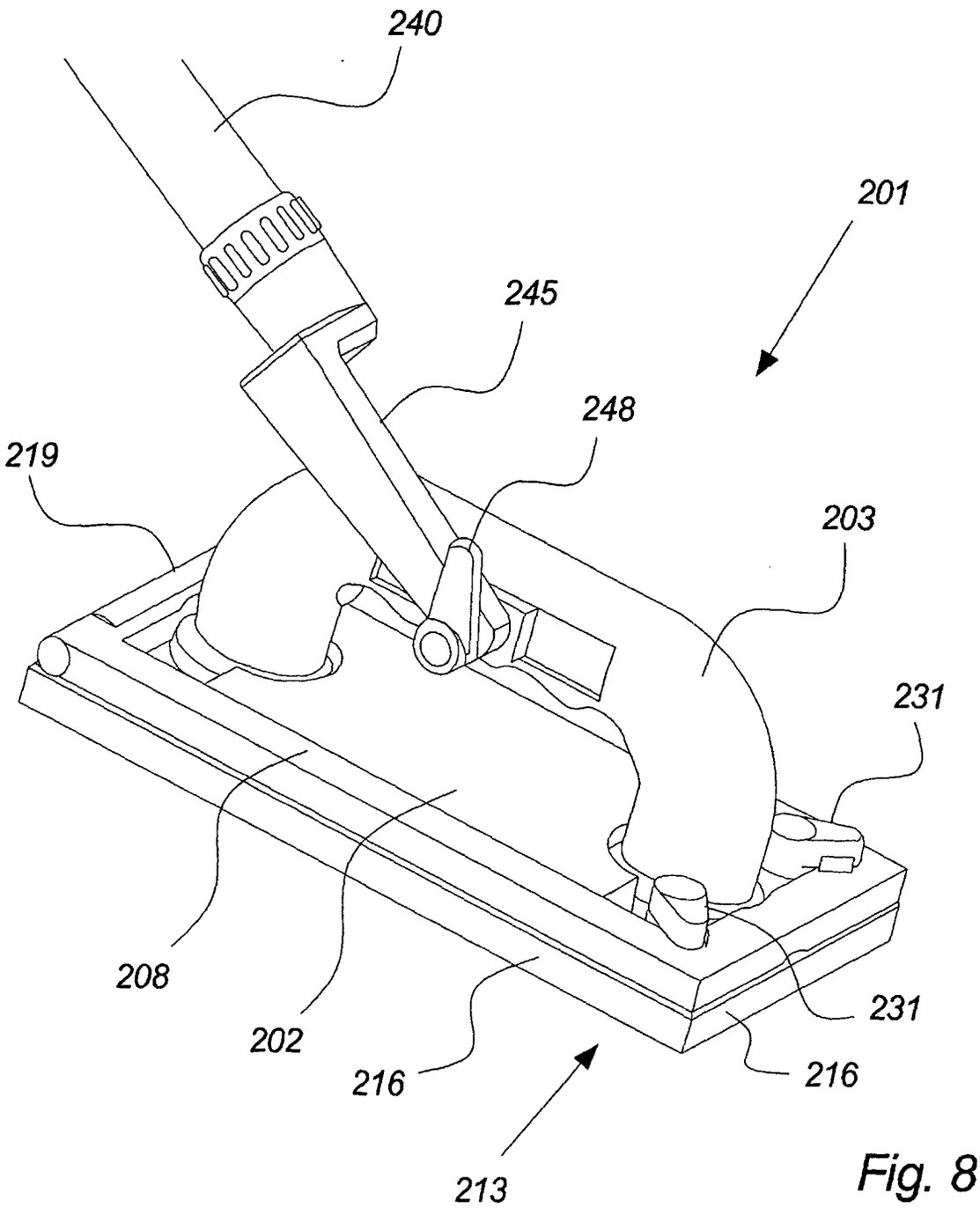

Fig. 8